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### **Assessing the State of Procurement Knowledge Production: Implications for the Federal Government**

**31 October 2011**

**by**

**Capt. Alfred D. Fryman, USAF, and**

**Capt. Kenneth A. Haile, USAF**

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**Naval Postgraduate School**

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# Abstract

This study seeks to understand the realm of purchasing knowledge in order to glean theoretical and practical insights that are useful to academicians and practitioners. The primary goals are to evaluate the extent to which purchasing research relies on theory and to identify and summarize the central theories germane to the purchasing discipline. Additionally, using social network analysis, this study explores patterns and insights from knowledge producers (i.e., individuals and institutions) and knowledge repositories (i.e., academic journals). Finally, this research combines the theoretical analysis and the social network analysis to identify the best practices that can be used in federal procurement.

**Keywords:** Purchasing, Supply Chain Management, Procurement, Federal Acquisition, Contracting, Social Network Analysis, Public Sector, Private Sector, Theory Use, Best Practices



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## List of Acronyms and Abbreviations

DoE	Department of Energy
DS	Decision Sciences
EDI	Electronic Data Interchange
GAO	Government Accountability Office
<i>IJPDLM</i>	<i>International Journal of Physical Distribution and Logistics Management</i>
IMM	Industrial Marketing Management
<i>JBL</i>	<i>Journal of Business Logistics</i>
JCR	Journal Citation Reports
<i>JM</i>	<i>Journal of Marketing</i>
<i>JOM</i>	<i>Journal of Operations Management</i>
<i>JPSM</i>	<i>Journal of Purchasing &amp; Supply Management</i>
<i>JSCM</i>	<i>Journal of Supply Chain Management</i>
MSU	Michigan State University
NPD	New Product Development
RBV	Resource-Based View
SPS	Supplier Perception Survey
TCA	Transaction Cost Analysis
TCE	Transaction Cost Economics



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# I. Introduction

## A. Overview

The federal government spends hundreds of billions of tax dollars each year acquiring goods and service, yet over the past two decades the Government Accountability Office (GAO) has constantly identified systemic weaknesses in key areas of federal procurement (GAO, 2005). These weaknesses include the poor use of procurement knowledge management systems (GAO, 2009b), the poor use of award fee contracts (GAO, 2009a), lack of training and understaffed acquisition workforce (GAO, 2007), the poor management of service contracts (GAO, 2008b), the overpayments on contracts that are not awarded competitively (GAO, 2007), and many more (GAO, 2005). Combining today's budget constraints caused by the weak economy (Congressional Research Service, 2011) with the systemic weaknesses pointed out by the GAO, there is clearly a need for more efficiency in federal procurement. Through an examination of existing research in the field of purchasing, the federal government can begin to address its weaknesses in federal procurement.

Because meaningful research is grounded in theory, in order for a field of study to be considered a mature discipline, it must not only use but also develop theory (Defee, Williams, Randall, & Thomas, 2010). Good theory is first needed to advance practices in the field (Van de Ven, 1989), and Chandra & Kumar (2000) also identify the importance of integrating ideas that originate from an implementation of the theory itself. In this study, we seek to evaluate the extent to which purchasing field research relies on theory and to identify and summarize the central theories germane to the purchasing discipline. Additionally, in this study, we use social network analysis to explore patterns and insights from knowledge producers (i.e., individuals and institutions) and knowledge repositories (i.e., academic journals). Finally, in this research we combine the theoretical analysis and the social network analysis approaches to identify the best practices that can be used in federal procurement. In this chapter, we outline the subsequent research



that is necessary to understand the realm of purchasing knowledge in order to glean theoretical and practical insights that will be useful to the progression of federal procurement. We first introduce the background, problem statement, research objectives, and research questions associated with this project. We then provide an overview of the methodology, and then explain why this research is important to purchasing academicians and practitioners.

## B. Background

The art of purchasing is as old as the concept of currency and bartering itself. For thousands of years cultures have engaged in purchasing activities. However, the field itself did not coalesce into a separate industrial function until the mid-1800s (Leenders & Fearon, 2008). An early example is found in Charles Babbage's 1832 discourse, *On the Economy of Machinery and Manufactures*, which recognized how important the contributions of the "materials man" (p. 202) was to the successful operation of a mining consortium. Another reference identified through research conducted by Fearon (1989) documented the contribution of purchasing during the latter half of the 19th century. Specifically, Fearon (1989) identified an 1870 occupational publication entitled "Purchasing Building Materials," which indicated that "through judicious purchasing a firm may be able to effect substantial savings in total production costs" (p. 72). However, the field itself remained relatively fragmented until the early 20th century.

The purchasing field began the process of consolidation in 1915 with the establishment of shared constructs with the founding of the National Association of Purchasing Agents (NAPA; Fearon, 1989). The National Association of Purchasing Agents, which in 1968 transformed into the National Association of Purchasing Managers and in 2002 into the Institute for Supply Management, served as the foundation for purchasing's development into a recognized profession. Specifically, the NAPA's commitment to advancing the profession was critical in that it brought together a large group of committed individuals in order to further the development of the body of purchasing knowledge as well as to advance the scholarly nature of



the profession itself (Fearon, 1989). Although the establishment of purchasing as a professional field was important, equally important was establishing purchasing's scholarly credentials. The last 45 years have seen the purchasing field make significant strides toward establishing its scholarly credentials by making the field more professional and theoretically based.

In most professional circles, in order for a field to be viewed as scholarly, it must be served by a peer-reviewed journal (Rowland, 2002). Researchers across multiple disciplines, including purchasing, have surmised that the four main functions of scholarly literature “are dissemination of current knowledge, archiving of the canonical knowledge base, quality control of published information, and assignment of priority and credit for their work to authors” (Rowland, 2002, p. 1). Peer review is necessary, primarily to achieve the four main functions described by Rowland (2002). The most important of these functions is quality control (Rowland, 2002). It is quality control, often referred to as *refereeing*, that is primarily responsible for enforcing the overall standards of scholarly literature in the field. Studies have shown that as many as 80% of articles published in scholarly journals undergo significant revision as a result of this practice (Lock, 1985).

Practitioners in the field of purchasing strove for decades to obtain the level of recognition that a peer-reviewed journal offered. This goal was realized in the 1960s with the publishing of the profession's first peer-reviewed journal, the *Journal of Purchasing*. During the subsequent 45 years, the *Journal of Purchasing* has developed into a highly respected scholarly journal. Over time, its name has changed to the *Journal of Supply Chain Management*; however, its mission to improve purchasing and other related fields of research has not changed. Articles from this journal and from other top-tier journals within the discipline offer readers a summary of the current development of the field. Researchers contribute to the advancement of purchasing literature through various means. Specifically, the articles published on purchasing-related topics have expanded the field of research by presenting new theories and ideas within the field. Theory, as defined by Creswell



(2009) is “an interrelated set of constructs (or variables) formed into propositions or hypotheses, that specifies the relationship among variables (typically in terms of magnitude or direction)” (p. 51). Creswell goes on to state that “theory might appear in a research study as an argument, a discussion, or a rationale, and it helps to explain (or predict) phenomena that occur in the world” (2009, p. 51).

Another critical aspect of research of this nature is the application of new theories to existing problems, the elimination of gaps in knowledge, the identification of the limiting conditions or other factors that restrict a theory’s implementation, the addressing of inconsistent results, and the tackling of problems that are of benefit or interest to practitioners in the field (Brown & Dant, 2009). Additionally, research indicates that a stronger perception of the role that theory plays in purchasing research “should open new avenues for making substantive, methodological, and theoretical advances” (Brown & Dant, 2009, p. 113). The bottom line is that relevant theory is also needed to advance the practice of a profession “precisely because it advances knowledge in a scientific discipline, guides research toward crucial questions, and enlightens the profession” (Van de Ven, 1989, p. 486).

### C. Problem Statement

As we identified in the background section, theory-based research is essential for the advancement and maturity of a profession. Specifically, theory is a prerequisite for the maturity of a discipline because good research is grounded in theory (Manuj & Mentzer, 2008). In this research, we use Hunt’s (2002) definition of theory, which is a construct that is able to both explain and predict phenomena, to differentiate theory-based efforts from those that are atheoretical in nature. This definition is critical to our research because theory is essential to furthering scientific understanding through the creation of constructs that are capable of not only explaining but also predicting these occurrences (Hunt, 1991). There have been numerous calls for an increase in theory-based research in the field of purchasing over the last 10 years (Carter & Ellram, 2003). Although the extent of theory reliance has been recently examined in the supply chain domain (Defee et al., 2010),



purchasing-based knowledge was under-represented because Defee et al.'s study omitted many key purchasing journals. Furthermore, a social network analysis has been applied to only one purchasing journal (Carter, Leuschner, & Rogers, 2007), whereas key purchasing knowledge resides in multiple journals.

Good theory is also needed to advance practice (Van de Ven, 1989). The federal government recognizes the value of theory-based research and graduate education in strategic purchasing—evidenced by its investment in an acclaimed strategic purchasing program at the Naval Postgraduate School. In recent years, the federal government has sought to increase its strategic sourcing capability through a variety of initiatives. By conducting gap-analysis research on its sourcing efforts and dominant theories, the government can identify potential areas for improvement. Also, by conducting a social network analysis on the purchasing field, the government will be able to explore patterns and insights from the knowledge producers and repositories. After identification, the government can exploit that knowledge base to better employ purchasing theories in federal purchasing initiatives.

#### D. Research Objectives

To address the concerns identified in the problem statement, we seek in this research to achieve the following objectives:

- determine the extent to which theory is used in the purchasing field of research,
- uncover and summarize the prevalent theories found in the purchasing field of research,
- analyze the social network of purchasing knowledge production, and
- examine how purchasing theory can inform and improve federal government purchasing practices.





## E. Research Methodology

In order to investigate the four research objectives, we provide a summary analysis of the use of theory and of the logic surrounding the use of the theory in purchasing literature. We collected data on the use of theory through coding from select scholarly journals in the field of purchasing. The data collection also contains an affiliation listing of the authors, containing both the school from which they received their terminal degrees and the school (or institution) at which they published the article. The specific journals, and the means by which we selected them, can be found in Chapter II. We completed this summary analysis in order to evaluate the incidence of theory use in the articles as well as to determine whether the request for an increase in theory-based research in the field of purchasing has occurred. The results from this analysis can be found in Chapter III. In order to analyze the social network of purchasing knowledge production and to identify centers of purchasing excellence, we used a social network analysis software package on the affiliation data we collected from purchasing articles. The results from this analysis can be found in the Social Network Analysis section of Chapter IV. In order to achieve the fourth objective, we used the results from the theory and social network analyses in combination with information we obtained on commercial-sector purchasing best practices. The resulting analysis, implications, and applications for federal procurement are located in Chapter IV.

## F. Significance of Research

The results of this research have significant implications not only for academicians and practitioners in the purchasing field but also for the federal government as a whole. Achieving the first objective of this research provided firm, quantitative evidence of the extent of theory use in the purchasing field of research during the period 2002–2009. The results we derived from the secondary objective provided a summary and analysis of the prevalent theories found in the purchasing field of research and an examination of the underlying trends present in the data. This finding also provided insights that may further other scholarly work in the field.



Completing the tertiary research objective provided an analysis of the underlying social networks found in theory-based purchasing research and publication. This finding allowed for the identification of centers of excellence in purchasing research. The results we obtained from the final objective allowed for a comprehensive examination of how purchasing theory can inform and improve federal procurement practices.

## G. Scope, Limitations, and Assumptions

In this research we focused on trying to identify and understand the realm of purchasing knowledge in order to glean theoretical and practical insights that will be useful to federal procurement practitioners. We do not evaluate how the federal government is currently performing, but instead we look at the purchasing field for the best practices to bring back to all federal agencies.

The limitations of this research—common to most qualitative assessments—include problems encountered when coding large amounts of data. To ensure the validity of our coding process, we used a rigorous process-oriented approach modeled by Defee et al. (2010). To ensure the homogeneity of the results, we established a baseline for the different categories. To maintain the legitimacy of the baseline, we met frequently to synchronize our individual understanding of the coding process.

Although the eight-year range (2002–2009) we used in this research provides significant insights into the field, it does represent a rather narrow range given the length of time the purchasing field has been a profession. Additionally, whereas social network analysis provides an important measure of centrality, research has shown that the measure cannot be used to compare networks of different sizes (Scott, 2000). This factor reduces the number of centrality comparisons that can be made with the sample data sets (baseline, inquiry, and full sample) because their networks are shaped differently (Scott, 1987).



Every attempt was made to conduct the literature review process in an unbiased and objective manner, but research has shown that investigators may engage in

the selective inclusion of studies, differential subjective weighting of studies in the interpretation of findings, misleading interpretations of study findings, the failure to examine characteristics of the studies as potential explanations for disparate or consistent results across studies, and the failure to examine moderating variables. (Wolf, 1986, p. 10)

The process, as well as the assumptions we made, is described in detail in Chapter II.

## H. Summary

In this chapter we provided the background, problem statement, and research questions associated with trying to find and understand the realm of purchasing knowledge in order to glean theoretical and practical insights that will be useful to federal procurement practitioners. In Chapter II we discuss the specific methodologies we followed in this research project.



## II. Methodology

### A. Overview

We primarily used quantitative methods in conducting this research. However, we obtained small elements of the study, specifically those associated with the collection and interpretation of the industry's best practices, through qualitative methods. In this chapter we break the research undertaken for this study into three areas: analysis of purchasing theory, social network analysis, and analysis of best practices. The methodologies for each of the individual analysis areas are located in the following sections of this chapter.

### B. Journal Selection Methodology

In an effort to summarize and analyze the prevalent theories found in the purchasing field, we conducted an extensive literature review of the top scholarly journals in the field of purchasing for the eight-year period 2002–2009. To determine whether the numerous calls for an increase in theory-based research in the field of purchasing over the last 10 years (Carter & Ellram, 2003) had been addressed, we established a baseline period from 2002 to 2005 to determine the level of theory-based research prior to the calls. After we established the baseline, we employed the same review methodology to review articles from 2006–2009 to determine whether an increase in theory-based research had actually occurred.

Similar research (Defee et al., 2010) that used selections of top journals in the field of purchasing failed to substantiate the rationale behind the journals selected for analysis, potentially reducing the overall impact of their findings. To avoid this pitfall in our research, we surveyed the editors of and frequent contributors to peer-reviewed purchasing-related journals and received 13 responses. Due to manpower and time constraints associated with this research, we made the decision to limit the total number of journals reviewed to eight. Our first step in defining the sample was to determine the top eight journals in the field of purchasing. We surveyed 26 top



purchasing subject-matter experts, including editors of peer-reviewed purchasing journals, and asked them for their opinion of which journals are the top journals in the field. We then tabulated, consolidated, and ranked the top eight journals according to their responses, which identified the following journals as the top journals in the field with the journal receiving the most responses listed first:

- (1) *Journal of Supply Chain Management (JSCM)*,
- (2) *Journal of Operations Management (JOM)*,
- (3) *Journal of Purchasing & Supply Management (JPSM)*,
- (4) *Journal of Business Logistics (JBL)*,
- (5) *International Journal of Physical Distribution and Logistics Management (IJPDLM)*,
- (6) *Industrial Marketing Management (IMM)*,
- (7) *Decision Sciences Journal (DS)*, and
- (8) *Journal of Marketing (JM)*.

To substantiate the responses from the subject-matter experts, we consulted the two following reputable sources for journal quality and ranking information: the 2006–2009 Thomson-Reuters “Journal Citation Report Impact Factors” (Thomson-Reuters, 2010) and the 2011 *Harzing Journal Quality List*, 39th edition (Harzing, 2011).

## **1. Thomson-Reuters**

The first step in verifying the list of top journals recommended by the subject-matter experts was to look at the overall impact that each of the journals create. The most widely recognized tool for accomplishing this is the Journal Citation Reports (JCR) database maintained by Thomson-Reuters (Chapman & Ellinger, 2009). The JCR system has been recognized as both a relevant and reliable metric of a journal's credibility and success (“Impact Factor,” n.d.). The database contains a



variety of statistical information, but the item of interest for this research is an element known as the *impact factor*.

An impact factor, as defined by Thomson-Reuters, is a “measure of the frequency with which the average article in a journal has been cited in a particular year or period” (“Impact Factor,” n.d.). It is frequently used as a proxy for the relative importance of a journal within its field, specifically for articles that are published in the social science field. Journals with higher impact factors are considered to be relatively more important because they are found to be cited at a higher frequency than other journals (“Impact Factor,” n.d.). This measurement was perfect for our research in that it provided empirical evidence to support the claims that the selected journals are well regarded within the field of purchasing.

The JCR data was available for the period 2006–2009. Specifically, we reviewed the two available impact factors from the JCR database: (1) the impact factor and (2) the five-year impact factor.

- (1) The impact factor as defined by Thomson-Reuters is “the average number of times articles from the journal published in the past two years have been cited in the JCR year” (“Impact Factor,” n.d.). It is calculated by “dividing the number of citations in the JCR year by the total number of articles published in the two previous years” (“Impact Factor,” n.d.).
- (2) The five-year impact factor is defined and calculated as “the average number of times articles from the journal published in the past five years have been cited in the JCR year. It is calculated by dividing the number of citations in the JCR year by the total number of articles published in the five previous years” (“Impact Factor,” n.d.).

Information concerning the JCR data from 2006–2009 is located in Table 1.



**Table 1. JCR Impact Factor 2006–2009**  
(Thomson-Reuters, 2010)

Journal Name	<i>Impact Factor</i>									
	JCR 2006		JCR 2007		JCR 2008		JCR 2009		JCR 2010	
	Impact Factor	5-Year Impact Factor	Impact Factor	5-Year Impact Factor	Impact Factor	5-Year Impact Factor	Impact Factor	5-Year Impact Factor	Impact Factor	5-Year Impact Factor
<i>JSCM</i> **	-	-	-	-	-	-	-	-	5.853	11.706
<i>JOM</i>	2.042	-	1.851	3.798	2.42	3.814	3.238	4.178	5.093	6.029
<i>JPSM</i> *	-	-	-	-	-	-	-	-	-	-
<i>JBL</i> **	-	-	-	-	-	-	-	-	3.905	-
<i>IJPDLM</i> **	-	-	-	-	-	-	-	-	2.617	-
<i>IMM</i>	1	-	0.911	1.636	1.403	2.206	1.333	2.147	1.694	2.78
<i>DS</i>	1.62	-	1.435	2.414	2.318	3.131	2.38	3.276	2.233	3.937
<i>JM</i>	4.831	-	3.75	6.362	3.598	7.092	3.779	8.52	3.77	7.243

\* (Will be included in 2011 Report)

\*\* (Introduced in 2010 Report)

To interpret the *impact factors*, we first had to understand what the factors represented. For example, an impact factor of 1.0 means that, on average, an article that was published within the last two years and has been cited once (“Impact Factor,” n.d.). An impact factor of 2.5 for an article implies that an article has been cited two and a half times within the last two years. Included in this count are articles that may have been published in the same journal; however, research has shown that most cited articles are from other publications (“Impact Factor,” n.d.).

While retrieving the impact factors for all eight suggested journals, we discovered that four of the eight journals (*JSCM*, *JPSM*, *JBL*, and *IJPDLM*) were not completely included in the Thomson-Reuters Journal Citation Report database for the time period addressed in our research. Chapman and Ellinger (2009) identified this problem during the course of their research, indicating that “the development of supply chain management and logistics research and theory is severely hampered by the fact that the majority of specialist journals in the field are not included in the ... Journal Citation Reports” (p. 197). However, as noted at the bottom of Table 1, one journal (*JPSM*) is noted by the database as being included in the next report that covers 2011, which will be published in 2012. Four other journals (*JSCM*, *JPSM*, *JBL*, and *IJPDLM*), as noted in Table 1, were included in the JCR report for the first





time in the 2010 report, which was published in 2011. The lack of their inclusion in the database at this time (or for the whole time period addressed by our research) is not an indication that these four journals are substandard because several of the journals in the database will have their previous years' volumes included retroactively in the 2012 version (Emerald Group, 2010). The co-editor of the *JSCM* stated in a press release that *JSCM's* recent inclusion in the Thomson-Reuters Journal Citation Report database "will continue to help clarify and enhance understanding of the various aspects of supply chain management to individuals worldwide who can now incorporate relevant *Journal* content into their scholarly research and decision-making" (Institute for Supply Management, 2010). Using this understanding of the impact factor system, it appears that the journals recommended by the subject-matter experts are of great importance within the field of purchasing, given the relatively large impact factors.

## 2. Harzing

We also used the 2011 *Harzing Journal Quality List* to look at the overall impact that each of the journals creates. This list proved to be an important source of verification because it included a large sampling of international ranking structures. The *Harzing Journal Quality List* is a collection of journal rankings from a variety of sources and "is published primarily to assist academics to target papers at journals of an appropriate standard" (Harzing, 2011, p. 2). Further analysis of the *Harzing Journal Quality List* indicated that the academic institutions that serve as its source used journal impact factors in the calculation of their rating, and a primary source of the impact factors is the Thomson-Reuters Journal Citation Reports. In total, we used six of the sources that offered coverage of all eight of the recommended journals. Table 2 includes the available *Harzing Journal Quality List* information for the journals recommended by the subject-matter experts.





**Table 2. Harzing Journal Quality List Ranking**  
(Harzing, 2011)

<i>Harzing Journal Quality List Ranking</i>						
	WIE 2001	EJL 2006	ABDC 2010	ABS 2010	Cra 2010	VHB 2011
<i>JSCM</i>	A	S	B	1	3	B
<i>JOM</i>	A	STAR	A	4	4	B
<i>JPSM</i>	B	S	C	2	2	C
<i>JBL</i>	A	S	B	2	3	B
<i>IJPDLM</i>	B	S	C	2	3	B
<i>IMM</i>	A	S	A	3	3	C
<i>DS</i>	A	P	A	3	3	B
<i>JM</i>	A	STAR	A	4	4	A+

Our analysis of the ranking information provided by the *Harzing Journal Quality List* indicates that all of the selected journals are highly regarded journals, with several journals (including *JOM* and *JM*) being consistently recognized as top journals in their respective fields. A detailed explanation of each of the ranking systems used from the *Harzing Journal Quality List* is located in Figure 1. It is important to note that although the majority of ranking organizations found in the *Harzing Journal Quality List* are of an international nature, the formal and explicit rankings that Harzing offers are recognized as an essential tool that institutions use for “decisions concerning funding, appointments, tenure, promotions and above all assessments of the quality of research departments” (Mingers & Harzing, 2007, p. 303). Overall, the ratings indicated that the eight selected journals are an excellent representation of the purchasing field; therefore, we made no adjustments to the subject-matter experts’ recommendations.



**WIE 2001 — WU Wien Journal Rating 2001**

(Developed by Vienna University of Economics and Business Administration)

A/B Rating: "contributions are scientifically and methodologically most fastidious/innovative"

**EJL 2006 — Erasmus Research Institute of Management Journals Listing**

(Developed by Erasmus Research Institute of Management)

STAR "Top journals among those rated 'P'"

P "Best journals in the field"

S "Scientific refereed journals of a recognized academic reputation"

**ABDC 2010 — Australian Business Deans Council Journal Rankings List Feb. 2010**

(Collaborative list developed by the Australian Business Deans Council that seeks to list journals relevant to Australian business academics)

A "Highly regarded journal in the field or subfield"

B "Well regarded journal in the field or subfield"

C "A recognised journal - publishes research that is of a modest standard"

**ABS 2010 — Assoc. of Business Schools Academic Journal Quality Guide Mar. 2010**

(Stems from an analysis of where UK academics declared publications for the purposes of RAE 2001)

4 "A top journal"

3 "A highly regarded journal"

2 "A well regarded journal"

1 "A recognised journal"

**Cra 2010 — Cranfield University School of Management February 2010 (7th ed)**

(The grading for each journal is the School's view, and guided the School's submission to the RAE 2008)

4 "World Leading"

3 "Top International"

2 "Lower International"

**VHB 2011 — Assoc. of Professors of Business in German speaking countries**

(A ranking developed on behalf of the Association of University Professors of Business in German speaking countries)

A+ "VHB-JourQual Index > 9"

B "VHB-JourQual Index > 7"

C "VHB-JourQual Index > 6"

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**Figure 1. Harzing Journal Quality List Abbreviation and Ranking Explanation**  
(Harzing, 2011)



### C. Journal Article Analysis Methodology

Our first step in analyzing the articles was to determine which of the articles from the eight journals during the period 2002–2009 actually related to the field of purchasing before including them in our analysis. To establish whether an article pertained to purchasing, we used the purchasing field criteria first suggested by Das and Handfield in 1997. They identified “twelve key purchasing areas ... from current empirical research in the purchasing discipline” (Das & Handfield, 1997, p. 105). Das and Handfield based their criteria on extensive research and evaluation of the published works of experts in the field of purchasing (Gadde & Håkansson, 1994; Henke & Martin, 1989; Kolchin & Giunipero, 1993; Monczka & Trent, 1995; Reck, Landeros, & Lyth, 1992) to ensure that their list of subtopics would be “considered broadly reflective of contemporary themes in purchasing research” (Das & Handfield, 1997, p. 105). The 12 subtopics identified by Das and Handfield served as the basis for our article evaluation and purchasing classification method. The following is a list of the 12 sub-topics:

- (1) *Purchasing information systems.* Information flows to and from purchasing, electronic data interchange (EDI) with suppliers, procedures and record maintenance, and computer applications in purchasing areas.
- (2) *Early supplier involvement in cycle-time reduction/new product development (NPD).* Early supplier involvement in concurrent engineering, cost reduction, value engineering, logistics and time-to-market, and time-to-product cycle-time reduction. Processes, guidelines, measures, enablers, benefits, problems.
- (3) *Global sourcing.* Issues, solutions, practices, and policies in international buying and global sourcing. Purchasing interactions with global manufacturing and marketing issues. Processes, evaluation, impacting variables, benefits, and practices.
- (4) *Purchasing planning, organization, policies, and personnel.* Strategic research and long-term objectives, planning, budgeting, make/buy, organizational structure, policies regarding suppliers and buyers, buyer selection, and development-related issues.



- (5) *Purchasing performance measurement.* Performance evaluation of purchasing and purchasers; systems, criteria, issues, and linkages to corporate objectives.
- (6) *Single/multiple sourcing.* Benefits, problems, practices, systems in sole/single/parallel and multiple sourcing decisions.
- (7) *Supply chain integration.* Research on purchasing and supplier interaction, trade-offs, and relationships from a holistic supply chain perspective, including interorganizational information systems (non-purchasing) and logistics.
- (8) *Supplier selection and development.* Issues relating to supplier selection, evaluation and to development strategies, practices, and performance gains.
- (9) *Buyer–supplier relationship.* Action programs to achieve long-term, closer buyer–supplier ties. Covers economic and social issues in collaborative, partnership, and strategic alliances between suppliers and buyers. Does not include initial supplier selection or development activities.
- (10) *Supplier quality.* Supplier and buyer responsibilities, quality dimensions, practices, specifications, inspection, cost of quality, testing, and quality-control issues.
- (11) *Legal, ethical, and environmental issues.* Government (domestic), social, and ethical issues affecting buyers and suppliers.
- (12) *Cost, pricing, and contracts.* Supplier pricing practices, buyer cost and price analysis, total cost analysis and use, forward buying, target costing, contract types, practices, and determinants.

Das and Handfield (1997) published their work almost 14 years ago, and since then, purchasing has undergone a technological evolution with the expansion of such purchasing activities as e-procurement and e-commerce. To ensure that articles embracing new and developing technology and methods were classified properly, we made certain that the criteria were “technology neutral.” Essentially, we used the same criteria as outlined by Das and Handfield (1997), but we classified each article on the basis of which of the 12 subtopics it best fit into, taking into account that the terminology or technology used may have changed since 1997, but understanding that it met the spirit of the criteria.



In order to ensure the reliability of coding, we established a set of rules for coding each article. The easiest cases were when the title of the article or its abstract clearly included at least one of the 12 subtopics identified by Das and Handfield (1997). Identification was more difficult when the article described only one of the 12 subtopics, and even more difficult in instances where the focus was not clearly stated. In the latter case, we used inferential coding in a similar fashion as Defee et al. (2010), basing our determination on the authors' implicit description of purchasing subtopic. We made every effort to avoid mislabeling an article as purchasing when it was not warranted by both of us first coding a small sub-sample of articles. We then met to discuss any differences in our purchasing determination, and to further homogenize the purchasing article identification process. If either of us had a question about whether an article related to the field of purchasing, we asked the other to review the article and make the purchasing determination together. We developed a cross-checking process in which we both reviewed a sampling of the same articles to ensure the integrity of the coding process. This cross-checking approximated 10% of the 2,338 articles. Out of the 258 articles we both reviewed, we only coded six articles differently, resulting in a coefficient of reliability of 97.7% according to Kassirjian (1977).

After we made a determination as to whether the article constituted a purchasing article, we conducted a content analysis on each purchasing-related article to determine whether the article used theory. In this content analysis, we used Hunt's (2002) definition of theory to differentiate theory-based efforts from those that are atheoretical in nature. This definition was critical to our research because theory is essential to furthering scientific understanding through the creation of constructs that are capable of both explaining and predicting phenomena (Hunt, 1991). The content analysis we used followed the methodology used by Defee et al. (2010) and developed by Brown and Dant (2009). By using the approach established by Brown and Dant (2009) in this research, we established the number of theoretical incidences found in the articles we analyzed as our unit of analysis (Brown & Dant, 2009; Defee et al., 2010). As an example, Costantino and Pietroforte (2002) used



transaction cost analysis (TCA) in their research on the effects of subcontracting practices in the construction industry. Using the approach developed by Brown and Dant (2009), we counted this article as one theoretical incident. A similar example is found in Grimm's (2008) research effort on the application of economic principles to SCM, which used both structure-conduct-performance theory and the resource-based view (RBV) of the firm as the theoretical base for the research. Again, using the approach developed by Brown and Dant (2009), we counted the two unique theories used in Grimm's (2008) research as two theoretical incidents.

To jump-start our theoretical classification effort, we used the theory listing developed by Defee et al. (2010). This list served as a baseline for our classification effort in that it was essentially a bank of theories that we could draw upon during our research. We did not use all of the theories cataloged by Defee et al. (2010) in our review of articles during the course of our research.

To determine whether an increase in theory use in purchasing research occurred, we conducted several statistical analyses. Specifically, we tested for differences in the proportion of articles using theory and for differences in the average number of theories used per article. The specific findings from our classification process can be found in Chapter III and an analysis of our findings can be found in Chapter IV.

#### D. Social Network Analysis Methodology

Using the articles that we classified as purchasing-related, we conducted a social network analysis in order to better understand the underlying social network of purchasing knowledge production. Specifically, we sought to identify which universities or institutions represented the largest sources of education in the purchasing field and to identify which institutions produced the most purchasing knowledge through publication. The adjacency matrix in Table 3 and the corresponding sociogram in Figure 2 provide an example of how we calculated these relationships.





**Table 3. Sample Adjacency Matrix**  
(Carter, Leuschner, et al., 2007)

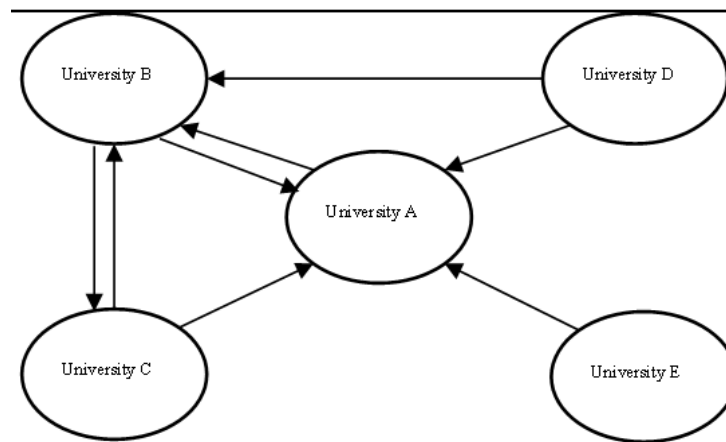
---

*Sample Adjacency Matrix*

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	University A	University B	University C	University D	University E
University A	-	13	2	0	1
University B	12	-	1	0	5
University C	4	6	-	0	9
University D	2	4	5	-	2
University E	1	2	1	0	-

---



**Figure 2. Sample Sociogram**  
(Carter, Leuschner, et al., 2007)

To examine the influence that universities and other institutions have had with respect to educating and publishing in the purchasing field, we calculated the *network centrality* of the data. This network centrality measurement used Leavitt's (1951) work, which stated that the extent of participation by actors within a network can be visualized. The network centrality measurement also relied heavily on Freeman's (1979) degree and betweenness dimensions of centrality.

We used this method of centrality analysis for this research because it addresses the goals of this research and because this methodology has been widely accepted and adopted within the field of social network analysis research (Scott, 2000). This type of social network analysis research has been conducted previously. Carter, Leuschner, et al. (2007) conducted a social network analysis to examine the measure of network centrality among universities, but they only examined the *Journal of Supply Chain Management* from 1965–2004.

The term *degree*, as defined by Carter, Leuschner, et al. (2007), is “the number of ties that an actor has to other actors in a network” (p. 18). For the purpose of this research, the different institutions that educate and publish in the purchasing field represent “actors.” Carter, Leuschner, et al. (2007) demonstrated that an actor’s degree is determined by summing the links between that actor and the other actors within a sociogram. An example of this means of calculation is shown in Figure 3 in Chapter IV. Another method for calculating an actor’s degree is by using an adjacency matrix, where the values within a row or column are added to determine the degree, as shown in Figure 2. For the purposes of this research, a degree is represented by each occurrence of an author being educated at one university and publishing at another institution or university. An example of this would be if they were educated at University A and published at University B.

To best represent the directional flow of education to publishing that we sought to analyze in this network, we used a matrix structure to frame the data. For our purposes, the column of university names in Table 3 represents the institution at which the author received his or her terminal degree, and the row of universities represents his or her current affiliation from which they published the journal article.

For the five-university example depicted in Table 3 and Figure 2, University A has an “in-degree” of 19. This in-degree value means that of the 19 occurrences of authors publishing at University A, 12 of those being published were educated at University B, four at University C, two at University D, and one at University E. Providing the counterpoint to this is University D, which has a degree of 0 because it





did not have any published authors who received their educations from University A, B, C, or E.

*Betweenness*, from a social networking perspective, can be defined as the total number of paths that pass through a particular actor who is on the shortest path connecting two other actors (Freeman, 1979). When viewed with an academic perspective, an actor with relatively high betweenness centrality has greater influence over the network. This influence implies that it can act as a liaison between actors that have a lower betweenness centrality and exist in more isolated areas of the network (Ronchetto, Hutt, & Reingen, 1989). Using Freeman's (1979) methodology for calculating betweenness centrality values, it was first necessary to put the relational values shown in the adjacency matrix (see Table 3) into a binary format to calculate the number of paths that pass through any given actor. This methodology indicates that by taking the shortest routes in the sample network shown in Table 3 and Figure 2, it is possible to calculate the betweenness scores for each of the sample universities. For example, University B is between Universities D and C, A and C, and E and C, and as a result, achieves a betweenness score of three. The same exercise can be completed for the other universities and results in University A receiving a score of one, and both Universities C and D receiving scores of zero because no paths cross through either institution.

To examine the measures of network centrality, we used a database of information derived from the journal articles we reviewed. This database contained a list of the authors, the schools from which they received their terminal degrees, and the school or institution which they were affiliated with at the time the article was published. We used this information to construct a 653 by 653 cell matrix in a spreadsheet that encompassed all of the possible relations between the different institutions in a similar format to the example depicted in Table 3. We then imported this spreadsheet into UCINET 6, a powerful social network analysis tool (Borgatti, 2002). After that, we ran the data through the NetDraw interface of UCINET 6 to conduct the analysis.



The reliability of aggregate social network analysis measures (such as popularity) is higher than the reliability of “choices” made by individual actors (Burt, Marsden, & Rossi, 1985). This means that because our conclusions are drawn from the analysis of the data points as a whole, the recommendations drawn from the social network analysis are more reliable than the data points individually. To ensure that the results obtained from our social network analysis were valid, we utilized large sample sizes. Research conducted by Scott (2000) indicated that “if the sample is large enough, [social network analysis] estimates ought to be reliable” (p. 59). Our specific findings from the social network analysis can be found under the Social Network Analysis heading in Chapter IV.

#### E. Best Practices Analysis Methodology

Out of the social network analysis emerged the final step in our research, an examination of best practices activities within the purchasing realm. A best practice is defined as “a procedure, a process, or a system that can have a noticeable long-term positive impact on the objectives of your purchasing organization” (O’Reilly, 2008, pp. 1–2). For the purpose of our research, we reviewed existing literature on the application of private-sector purchasing best practices to the public sector. This review was necessary for two reasons.

The first reason is that it allowed for an examination of what had failed or succeeded in the past. This first element is key because it allowed us to adapt our research accordingly. For instance, if an effort to adopt commodity council operations in a public-sector procurement environment failed, we could identify what went wrong and look for lessons learned. An additional benefit of the analysis was that it allowed us to identify which elements had been successfully translated from the private sector to the public sector. The success stories were then analyzed to see whether they were of significance to the federal government’s sourcing efforts and whether any incremental improvements to performance could be realized through our research. A second benefit for the review was that it permitted us to perform what essentially was a gap analysis of best practices applications. This



allowed us to identify what had been tried and to realize that we had a problem that had not been addressed by extant literature. This left us with an opportunity to find a solution to this problem in this thesis.

Feeding into this review of extant literature on the industry's best practices was our interaction with other purchasing professionals. To ensure that the research was balanced, we engaged both private- and public-sector sources. Specifically, we attended a presentation by a senior procurement professional in the private sector who provided a firsthand account of previous dealings with government sourcing to identify opportunities to improve the federal government's sourcing activities. To complement this interaction with a private-sector professional, we attended the 2011 National Contract Management Association (NCMA) World Conference in Denver, Colorado. This provided us with an opportunity to interact with other public-sector procurement professionals as well as with a select number of private-sector procurement professionals. The conference also presented information on the efforts of other federal agencies to employ industry best practices and provided direction for our research.

This background information combined with the data we accumulated through the identification of the top 10 theories in purchasing research (Chapter III) and the centers of publishing and education using social network analysis (Chapter IV) gave us a lens through which to view private-sector best practices that can be successfully adapted for use in federal procurement.

## F. Summary

In this chapter we explained how we composed the sample of scholarly journals and purchasing articles used in this research. We then explained how we conducted the research through the use of a variety of quantitative research methodologies. Small elements of the study, particularly those associated with the best practices, were obtained through the use of qualitative methods. We divided the methodology for the research in this study into three areas: analysis of purchasing



theory, social network analysis, and analysis of best practices. In Chapter III we introduce and analyze the top 10 purchasing theories found during the research.



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### III. Theory Usage

#### A. Overview

In this chapter we review the top 10 theories used by the purchasing field, which we uncovered during the course of an extensive literature review of the top scholarly journals in the field of purchasing for the eight-year period 2002–2009. A review of the methodology we used to determine the top scholarly journals in the field of purchasing can be found in Chapter II. To start our theoretical classification effort, we used the theory listing of 181 unique theories developed by Defee et al. (2010) as a baseline. We did not use all of the theories cataloged by Defee et al. in reviewing the articles for our research. However, during our theory classification effort, we catalogued 41 additional theories not included in Defee et al.'s list.

#### B. Overview of Theoretical Incidents

Our content analysis of 2,338 articles in the top eight purchasing journals uncovered 725 articles (31% of the total article count) that we classified as purchasing articles based on the 12 subtopic purchasing criteria. Out of the 725 articles classified as purchasing, we classified 356 (49.1% of the purchasing article count) as being theory-based, with a total of 528 theoretical incidents recorded. From the sample of 356 articles that we identified as theory-based, we identified 123 unique theories. Of the 123 unique theories that we identified, 10 of those theories were found to represent more than 50% of the total theoretical incidents. Table 4 is a representation of the 10 most frequently used theories. A table of the top 25 theories can be found in Appendix A.



**Table 4. Top 10 Purchasing Theories**

<b>Theory</b>	<b>Category</b>	<b>Count</b>	<b>% of Theoretical Incidents</b>
Transaction Cost Economics (TCE)	Microeconomic	82	15.53%
Resource-Based View (RBV)	Competitive	45	8.52%
Social Exchange Theory	Social Exchange	28	5.30%
Relationship Marketing	Marketing	23	4.36%
Contingency Theory	Competitive	21	3.98%
Resource Dependence Theory	Microeconomic	18	3.41%
Agency Theory	Microeconomic	16	3.03%
Game Theory	Microeconomic	15	2.84%
Organizational Learning	Theories of Organizations	12	2.27%
Social Network Theory	Social Exchange	12	2.27%

## C Summary of Identified Theories

Using the list of the 10 most frequently observed theories developed from our research, we synthesized each of the theories. To provide insight to both practitioners and academicians, we also explained the relevance and importance of each theory to the field of purchasing.

### 1. Transaction Cost Economics

Transaction cost economics (TCE), also referenced as transaction cost analysis (TCA; Ellram & Stanley, 2008) or as transaction cost theory (TCT; Parker & Hartley, 2003), has its roots in Coase's 1937 seminal work, "The Nature of the Firm." It is here that Coase introduced the idea of TCE and referenced the importance of understanding the costs of market transactions. It was in this work that Coase (1937) defined a transaction cost as "the costs of carrying out exchange transactions" (p. 7). Modern-day examples of transaction costs are the costs incurred in searching for vendors, partners, or customers; the costs associated with the establishment of contracts; and the costs of policing and administering the terms and conditions of the contract itself (Williamson, 1975, 1985).



Coase's ideas were expanded by the work of economist Oliver Williamson (1975, 1985). Williamson provided further clarification to Coase's (1937) theorization that both firms and markets serve as their own unique governance structures; however, the transaction costs associated with both governing structures vary. Coase suggested that in some situations, it may be more expensive to conduct the economic exchange in the marketplace (outsourcing) than it may be to conduct the function within the firm itself. Williamson (1975, 1985) took this idea and further refined it by specifying which exchanges the firm should conduct internally in order to avoid the excessive transaction costs associated with conducting those types of transactions in the marketplace. Williamson (1975) also identified that transaction costs were of a larger scale than Coase initially described. Williamson argued that there are two components that supplement transaction costs: direct costs and opportunity costs. The direct costs are easier to measure and are the costs that are incurred in managing the relationship, such as the salary paid to quality control personnel who inspect incoming products. The opportunity cost component is not as clear-cut as the direct cost. It measures the potential loss resulting from poor governance choices, such as the potential revenue lost when a sales associate quits and a new associate must be trained.

Adding further dimension to the framework, Williamson (1985) suggested that human behavior and the dimensions of the transaction also play an important role in understanding transaction costs. In particular, Williamson addressed the problems that opportunism and bounded rationality represent to human behavior in the decision-making process as well as the roles that uncertainty and asset specificity have on the dimension of the transaction.

Bounded rationality can be defined by this statement: "the capacity of the human mind for formulating and solving complex problems is very small compared with the size of the problems whose solution is required for objectively rational behavior in the real world" (Simon, 1957, p. 198). Essentially, this constraint identifies the fact that a decision-maker may be required to solve a problem using a





heuristic that is not entirely appropriate for that particular situation. Bounded rationality represents a significant problem in situations where the terms and conditions of the exchange cannot be confirmed prior to the transaction, resulting in environmental uncertainty. Bounded rationality can be problematic as well in situations where it is difficult to evaluate performance after the exchange has occurred, resulting in behavioral uncertainty.

The traditional counter to environmental uncertainty is for one, or all, of the affected players to adapt. However, adaption is not always easy to achieve, especially when the behavior and actions of the firm are tightly governed by a contract. An example of this difficulty would be a manufacturer who responds to the entry of a new competitor in the marketplace. The manufacturer now feels the need to improve or upgrade the design of its product offerings so that it can continue to sell its products in a competitive environment (Williamson, 1985). To achieve this new upgrade or improvement to its product offerings, changes to the design of outsourced subcomponents may be required. Williamson (1985) also explained that unless this design change was foreseen during the initial contract negotiations with the subcomponent supplier and included in the terms and conditions, the manufacturer could face considerable supplemental transaction costs associated with ongoing renegotiations to meet their new requirement.

Behavioral uncertainty can also cause a performance evaluation problem. That is to say, it can cause difficulty in verifying whether business partners are in compliance with established agreements. Kwon and Suh demonstrated this in their 2004 study of supply chain partnerships. Their research concluded that information sharing among all parties reduces the occurrence of behavioral uncertainty. As a result, the level of trust between a firm and its vendors improves significantly (Kwon & Suh, 2004).

Opportunism is a sociological concept that states that when an individual in a position of power is given the opportunity, he or she may take actions of a self-serving nature. Further complicating the problem that opportunism represents is the



fact that it is difficult to predetermine whether an individual will demonstrate this type of behavior (Barney, 1990). Williamson (1985) provided the simplest definition of opportunism by defining it as “self-interest seeking with guile” (p. 47). This type of opportunistic behavior is most likely to occur in a situation in which the firm or the vendor (or both) must undertake significant transaction-specific investments (such as specialized equipment or perishable materials) because these types of investments can result in a “holdup” in which the vendor and firm can become overly reliant on each other, potentially resulting in a loss in income or profit to the subjugated partner (Klein, Crawford, & Alchian, 1978). The potential for a holdup situation is particularly relevant when the relationship between a vendor and a firm hinges on assets that have little to no value outside of their unique relationship. Ellram, Tate, and Billington (2008) proposed that firms will address the problem of opportunism, and the potential for holdups that goes along with it, by not outsourcing functions in which there is a high likelihood that the supplier will engage in opportunistic behavior. Research also indicates that the highest occurrence of supplier opportunism occurs when the firm cannot clearly specify its needs and lacks the capability to verify that the supplier is actually providing all of the goods or services required under the contract (Ellram & Stanley, 2008). This idea is further substantiated by several studies in the purchasing field. These studies have asserted that by openly sharing information among supply chain partners and by taking a long-term outlook on the buyer-supplier relationship, occurrences of opportunistic behavior will decrease (Ellram & Cooper, 1990; Gardner & Cooper, 1988). TCE’s assumption of opportunism is important. For example, if suppliers will likely behave opportunistically, the buyer must incur transaction costs to deter such behavior. Deterrence might include writing detailed terms and conditions and closely monitoring supplier performance. These extra efforts increase transaction costs.

Overall, TCE is often used to explain the boundaries of the firm. TCE essentially explains why certain functions are insourced versus outsourced. This is a critical point of understanding for purchasing personnel because it provides a greater understanding of the complexity of business transactions.



An example of an insourcing situation is one in which establishing an outsourced solution is too difficult (or risky) to undertake due to concerns regarding opportunism and bounded rationality, which essentially implies that the transaction costs to engage in this effort externally are too high. Another example is a task that is currently outsourced from the firm being brought back into the firm (insourced) “if such agreements turn out to be too costly to implement” (Franck, Melese, & Dillard, 2006, p. 243).

Firms will engage in outsourcing behavior when the costs associated with the transaction are lower than the costs the firm incurs while conducting the action internally. For example, when a transaction is not subject to the holdup problem, in that it does not require specific assets and the final product is simple in nature, “substantial production and transaction cost savings can be expected from outsourcing” (Franck et al., 2006, p. 246).

## **2. Resource-Based View**

Resource-based view (RBV) is a theory that allows for the identification of strategic resources within an organization. The core tenet of RBV is that the basis of a firm’s competitive advantage is found through the use of the valuable, or strategic, resources that the firm controls (Rumelt, 1984; Wernefelt, 1984). It is through the resources that the firm possesses that capabilities are developed; the resultant capabilities can be used to influence the performance of the firm (Gonzalez-Padron, Hult, & Calantone, 2008).

Barney (1991) classified these capital resources into three areas: physical, human, and organizational. Capital resources of a physical nature include the specialized technology used within the firm, its geographic location, its plant and physical property, and the ease with which it can obtain raw materials (Barney, 1991). Human capital consists of the “time, experience, knowledge and abilities of an individual ... which can be used in the production process” (Husz, 1998, p. 9). Capital resources of an organizational nature are most often found in the “firm’s



formal reporting structure, its formal and informal planning, controlling, and coordinating systems, as well as informal relations among groups within a firm and between a firm and those in its environment” (Barney, 1991, p. 101).

Barney (1991) went beyond identifying the resources themselves and established a premise for determining their value. The valuable, rare, imperfectly imitable, non-substitutable model is included as part of RBV (Barney, 1991). Each of the four characteristics of this model is singularly important; however, a resource cannot truly be a source of competitive advantage if it exhibits only one of the four characteristics (Dierickx & Cool, 1989; Priem & Butler, 2001). Essentially, this model implies that a resource can only be as competitive as its least competitive link. For example, for a firm to develop a sustained competitive advantage, its resources (physical, human, and organizational) must be of a heterogeneous nature and lack perfect mobility (Barney, 1991; Peteraf, 1993). What this heterogeneity results in are firm resources that cannot be imitated by competitors or substituted without incurring significant costs (Barney, 1991). In the long run, if the competitive environment fails to adapt to the firm’s resources, it is possible for the firm to achieve returns above the market average.

Quintens, Pauwels, and Matthyssens (2006) demonstrated how RBV is an important tool for purchasing professionals in the pursuit of a sustained competitive advantage. They postulated that “the firm’s strategic position with respect to global purchasing management is a central intermediate between a firm’s resources and capabilities in a certain business context and performance outcomes” (Quintens et al., 2006, p.882). To cement their sustained competitive advantage, Quintens et al. (2006) advocated that a firm use a global purchasing strategy to address challenges the firm’s purchasing department may face. At the same time, they proposed “building upon particular stocks of purchase-related resources and capabilities” that are unique to the firm (Quintens et al., 2006, p. 882). Together, these two strategies result in “leverage to functional and firm performance,” and they create a sustained competitive advantage (Quintens et al., 2006, p. 882).



### **3. Social Exchange Theory**

During the early 1960s, social exchange theory emerged as an idea that offered an explanation of how stability and social change were created as a byproduct of “negotiated exchanges” between individuals and groups (Blau, 1964; Homans, 1974; Kelley & Thibaut, 1959). Emerson (1976) refined the theory in the mid-1970s by introducing economic and psychological components to the theory that offered a more robust explanation of human behavior. Most important, Emerson explored the impact that human relationships play in the role of decision-making and found that most relationships are created through “the use of a subjective cost-benefit analysis and the comparison of alternatives” (Emerson, 1976, p. 338).

The foundations of social exchange theory suggest that all interaction individuals, or even firms, undertake is solely based on a realistic expectation that they will receive some form of reward as a result of their interaction or that punishment will be avoided (Emerson, 1976). Essentially, social exchange theory claims that the actions (or behavior) of a participant are calculated by assessing the value of the potential rewards stemming from the interaction and deducting from that the costs that are incurred to conduct the interaction itself.

An essential component of social exchange theory indicates that if an action or behavior is rewarded on a consistent basis, it is more likely that an individual or a firm will undertake that action consistently in the future (Griffith, Harvey, & Lusch, 2006). Additionally, when an individual or firm chooses to act, it will select the action that offers the reward with the greatest expected value (Griffith et al., 2006). However, if an individual or a firm takes an action believing that it will be rewarded, but as a result it either receives no reward or is even punished, the individual or firm will take measures to ensure that behavior is not repeated in the future (Homans, 1958).

Griffith et al. (2006) demonstrated an application of social exchange theory in the buyer–supplier relationship context. They presented a scenario in which a



supplier contributes to the development of one of its distributor's supply chain endeavors. Through its contribution to the distributor, the supplier develops an expectation that it will be rewarded for its actions at a later time by the distributor (Griffith et al., 2006). In their scenario they went on to state that the distributor understands that the supplier's investment is a significant action, and, in turn, the distributor feels that it possesses an obligation to "return the favor" to the supplier through various actions that improve the buyer-supplier relationship (Griffith et al., 2006). This sense of obligation often leads to stronger commitment from both the buyer and supplier, resulting in the establishment of long-term relationships and in the reduction of short-term exchanges (Johnson & Selnes, 2004). A decrease in the total number of short-term exchanges can reduce transaction costs for a firm, resulting in increased profits and a lower cost of doing business.

#### **4. Relationship Marketing**

Relationship marketing is an all-encompassing concept that suggests the marketing activities that firms and individuals engage in are all geared toward the establishment, development, and maintenance of successful relational exchanges (Morgan & Hunt, 1994). A clear understanding of relationship marketing requires distinguishing between a "discrete transaction," which entails a "distinct beginning, short duration, and sharp ending by performance" and "relational exchange," which "traces to previous agreements [and] is ... longer in duration, reflecting an ongoing process" (Dwyer, Schurr, & Oh, 1987, p. 13). A key component of relational exchange is trust; Spekman (1988) indicated that trust is so important that it forms "the cornerstone of the strategic partnership" (p. 78). Morgan and Hunt (1994) also highlighted the important role that trust serves in relationship marketing by stating that "successful relationship marketing requires relationship commitment and trust" (p. 20).

The *Oxford English Dictionary* defines trust as the "confidence in or reliance on some quality or attribute of a person or thing" ("Trust," 2010); and it defines commitment as "the action of entrusting, giving in charge, or commending"





("Commitment," 2010). These definitions complement the ones given by Morgan and Hunt (1994), who stated that trust is "when one party has confidence in an exchange partner's reliability and integrity" (p. 23) and relationship commitment is "an exchange partner believing that an ongoing relationship with another is so important as to warrant maximum efforts at maintaining it; that is, the committed party believes the relationship is worth working on to ensure that it endures indefinitely" (p. 23). Ensuring that a relationship contains both trust and commitment is essential for firms and individuals because it encourages them to cooperate with their business partners in order to maintain the investment that their relationship has become (Morgan & Hunt, 1994). Additionally, this cooperation reduces the likelihood that one of the partners will "jump ship" in favor of a short-term investment because they have the understanding that their current long-term relationship will offer greater benefits in the long run (Morgan & Hunt, 1994). Relationship marketing research indicates that high levels of trust and commitment allow each partner to undertake high-risk activities without the concern that the other partner will act in an opportunistic fashion and leave them in a holdup situation (Morgan & Hunt, 1994).

The sociological premise behind the prevention of opportunistic actions is the concept of norms, which function as a mechanism designed to inhibit deviant behavior (Stinchcombe, 1985; Thibaut, 1968). Relational norms are designed so that behaviors that encourage the development (and maintenance) of long-term relationships are rewarded, but self-serving behaviors are highly discouraged. Essentially, relational norms function as a defense measure that prevents individuals or firms from exploiting their power to fulfill a self-serving objective (Heide & John, 1992). Relational norms operate in three dimensions that are of particular relevance to the purchasing field: information exchange, solidarity, and flexibility (Heide & John, 1992).

Information exchange is defined as a bilateral assumption that all involved parties will provide to their partner, without coercion, all knowledge that may be of use to the partner (Heide & John, 1992). In a purchasing context, this idea takes the



form of a safety blanket for a supplier's operations in the sense that the supplier can expect that the buyer will provide (if necessary) a warning if it believes that its own actions may affect the profitability of the supplier. Because the supplier expects the buyer to regularly provide it with information, the supplier is able to handle the potential vulnerability associated with turning over decision control to the buyer with greater ease.

Solidarity is defined as a “bilateral expectation that a high value is placed on the relationship,” and “it prescribes behaviors directed specifically toward relationship maintenance” (Heide & John, 1992, p. 36). It also represents another safeguard for the supplier in that it deters the buyer from using decision control in a way that would cause harm to the buyer–seller relationship as a whole.

Flexibility is defined as the understanding that all persons involved in the exchange are willing and able to adapt as the situation evolves. From the supplier's point of view, it “represents insurance that the relationship will be subject to good-faith modification if a particular practice proves detrimental in the light of changed circumstances” (Heide & John, 1992, p. 35).

A central premise of relational exchange theory is that personal relations and interaction generate trust and discourage the occurrence of opportunistic behavior between firms (Zaheer, McEvily, & Perrone, 1998). Research indicates that there is a negative correlation associated with the occurrence of opportunism and firm performance (Crosno & Dahlstrom, 2008; Rindfleisch & Heide, 1997). Unfortunately, when opportunistic behavior occurs, it has a significant negative effect on relational norms that would otherwise improve the firm's performance and working relationship (Carey, Benn, & Krause, 2010; Carr & Pearson, 1999; Gassenheimer, Baucus, & Baucus, 1996; Nyaga, Whipple, & Lynch, 2010; Villena, Revilla, & Choi, 2010). The affected relational norms include goal congruence (Lejeune & Yakova, 2005), trust, commitment, cooperation, and satisfaction (Joshi & Stump, 1999; Morgan & Hunt, 1994). Practical research in the field of game theory indicates that actors will engage





in opportunistic behavior when the short-term gains associated with the behavior outweigh the rewards of a long-term relationship (Sobel, 2006).

Purchasing literature indicates that performance is thought to improve when more relational structures are introduced in response to high levels of uncertainty. Research conducted by Kalwani and Narayandas (1995) supports this finding through their empirical examination of the impact that long-term supplier relationships have on supplier performance. They found that suppliers who are engaged in long-term relationships with their customers are able to reduce their inventory and control costs, negotiate lower pricing with their upstream channel partners, and achieve (sustain) a higher level of performance when compared to firms that are not engaged in long-term relationships with their customers (Kalwani & Narayandas, 1995).

However, the optimal (performance-maximizing) structural response under conditions of low uncertainty is not clearly indicated in the existing body of research (Noordewier, John, & Nevin, 1990). Accordingly, when both commitment and trust are present in a relationship, they produce together an outcome that is more effective, productive, and efficient than trust or commitment alone (Morgan & Hunt, 1994). Essentially, trust and commitment lead to behaviors that enable relationship marketing to be successful (Morgan & Hunt, 1994).

Using a relational exchange example in their research, Handfield and Bechtel (2002) stated that “investments in supplier relationships are established to minimize risk, involving activities traditionally considered the exclusive domain of the other party” (p. 373). Handfield and Bechtel (2002) also suggested that these types of investments can cause the duration and quality of the underlying relationships to increase, resulting in a higher probability that the exchange partners will invest larger sums with each other in future transactions. Relational exchanges represent a key component of relationship marketing. Monczka, Carter, Scannell, and Carter (2011) demonstrated the effect that relational exchanges have on innovation with their research on how firms and their suppliers collaborated to advance the development



and innovation of new products and services. Their research indicated that innovation resulted in a competitive advantage for the procuring firm. For the firm to capitalize on a supplier's innovative activity, there must be arrangements in place to spur supplier innovation; in support of that activity are the relational exchanges that instill "high levels of trust and positive supplier working relationships" (Monczka et al., 2011, p. 8).

In essence, relational exchange is an alternate and more efficient form of interorganizational governance (Hawkins, Gravier, & Powley, 2011). When properly developed and implemented, relational exchanges can essentially preclude the need to establish draconian terms and conditions in contracts where they would otherwise be required (Chiles & McMackin, 1996). After all, a perfectly comprehensive contract that covers all possible future contingencies is not possible (Hawkins et al., 2011). Thus, relying solely on a contract as governance is imperfect and will likely result in future negotiations as each party adapts to changes. Through the proper use of relational exchange, firms can realize significant cost savings resulting from reduced transaction costs because such precautions as more formal surveillance are no longer necessary (Brown, Dev, & Lee, 2000). In addition to substituting for other more formal mechanisms of governance, relational exchange also acts to intensify the effectiveness of other safeguards such as risk neutrality (Chiles & McMackin, 1996). In an example from industry, research has found that mutuality of interests (i.e., relational exchange) reinforces and enhances the effectiveness of the ownership governance mechanism in exchanges between shippers and rail carriers (Palay, 1984).

Essentially, "relational exchange limits opportunism through the sharing of norms and values" (Brown et al., 2000, p. 54). In the purchasing realm, decreased opportunism can lead to more efficient transactions; more efficient transactions have lower transaction costs due to reduced monitoring and eased adaptation to changes. An additional benefit is that contracts can be written less stringently because the terms and conditions do not need to cover every potential contingency.



## **5. Contingency Theory**

A segment of behavioral theory known as contingency theory suggests that there is no ideal means to organize, lead, or make decisions regarding firms or individuals (Johnson, Klassen, Leenders, & Fearon, 2002). Instead, the best course of action is dependent on a number of internal (strategic) and external (environmental) factors; organizations tend to exhibit a stronger performance when their structure takes into account those factors such as growth rate and product differentiation (Galunic & Eisenhardt, 1994; Johnson et al., 2002). The underpinnings of contingency theory align with Chandler's (1962) research, which states that "structure follows strategy" (p. 314). Accordingly, a significant segment of research into contingency theory deals with an examination of the relationship between the size of an organization and how complex (or formalized) the organizational construct is (Johnson & Leenders, 2006). The classical interpretation of contingency theory suggests that as the level of uncertainty concerning any task increases, the more information there is to analyze before a decision can be made to act (Galbraith, 1973). Therefore, to reduce the amount of time required to reach that decision point, the decision-making process should be decentralized (Tushman & Nadler, 1978).

In the purchasing realm, Krause (1999), using contingency theory, reported evidence that a firm's perspective toward its suppliers is influenced by environmental conditions such as the breadth and depth of competition in that sector. Similarly, Ancarani and Capaldo (2005) successfully used a contingency approach to develop a decision-making model for facility managers in the public sector that sought to simplify the service selection process.

## **6. Resource Dependence Theory**

Resource dependence theory examines the effects of an organization's resources on its development and behavior. The development of resource dependence theory has been ongoing since the 1950s (Boyd, 1990). However, it



was not classified as a theory until Pfeffer and Salancik (1978) published their seminal work *The External Control of Organizations: A Resource Dependence Perspective*. Ulrich and Barney (1984) offered the simplest explanation of resource dependence theory by stating simply that the theory posits “how organizations work to acquire power” (p. 472). The foundations of resource dependence theory can be isolated through three assumptions (Pfeffer & Salancik, 1978; Ulrich & Barney, 1984). The first is that organizations are composed of both internal and external coalitions (Pfeffer & Salancik, 1978) and that these coalitions “emerge from social exchanges that are formed to influence and control behavior” (Ulrich & Barney, 1984, p. 472). The second assumption is that the operating environment is believed to contain scarce (or valued) resources that are essential to the survival of the organization (Pfeffer & Salancik, 1978). The final assumption is that organizations work to acquire control over resources that not only reduces their dependence on other organizations but also increases the “dependence of other organizations on themselves” (Ulrich & Barney, 1984, p. 472). The manner in which an organization procures its external resources tends to be representative of the way the organization practices both strategic and tactical management (Boyd, 1990).

In the field of purchasing, Handfield and Bechtel (2002) demonstrated that when there are only a few local suppliers capable of providing an essential commodity, buyer dependence demonstrates a negative correlation to the number of local suppliers (i.e., as the number of suppliers decreases, buyer-dependence increases). Handfield and Bechtel (2002) further speculated that in situations of that nature, the supplier may potentially take advantage of its relative power in the marketplace to extort the buyer. As a result, buyers have less leverage during negotiations, reducing the chance that a buyer will be able to negotiate a competitive price from the suppliers (Provan & Skinner, 1989). In another instance, research has shown that agriculture equipment dealers demonstrated fewer examples of opportunistic behavior when they used a sole-source supplier (Provan & Skinner, 1989). However, the sole-source supplier was found to demonstrate significantly



more examples of opportunistic behavior given its inherent control over the dealers (Provan & Skinner, 1989).

## **7. Agency Theory**

Eisenhardt's seminal and highly regarded 1989 article discussed the origins of agency theory, which is essentially an examination of the problems that occur when one group (known as the principal) delegates a project to another group (known as the agent). In particular, this relationship is analyzed in terms of the contract that forms the bond between the principal and the agent (Eisenhardt, 1989).

Agency theory research primarily focuses on the identification of situations in which problems may arise, such as when the goals of the agent and the principal are in conflict (Eisenhardt, 1985). Such a situation might exist when the compensation that the agent receives for his services is not tied to his performance under the contract (Eisenhardt, 1985). In situations of this nature, the participants' motivation tends to fall back to their own self-interests because the participants may have different levels of risk acceptance (Eisenhardt, 1989). As a result, the goals of the agent and principal may diverge. To curtail divergence, governance mechanisms must be instituted that prevent or limit self-serving behavior on the part of the agent. For example, studies on corporate behavior and performance have shown that the board of directors (which serves as the principal to the agent that is the CEO) for a corporation traditionally serves as the primary mechanism for both negotiation and enforcement of the principal-agent contract between the CEO and the shareholders (Eisenhardt, 1985; Rahim & Golembiewski, 2005). Essentially, the board of directors prevents the CEO from engaging in opportunistic behavior that would not benefit the shareholders.

Three articles in particular have been influential in the advancement of the positivist outlook on agency theory and have identified examples in which principal-agent divergence was successfully curtailed. A study by Jensen and Meckling (1976) demonstrated that when managers (the agents) were offered equity-sharing



options by their employers (the principals), the managers were less likely to demonstrate self-serving behavior because their interests were now in closer alignment with those of their employer (Jensen & Meckling, 1976). A second article addressed the proliferation of self-serving behavior among CEOs and how both capital and labor markets could be used as instruments of perfect information to counteract the potential for CEOs to engage in self-serving behavior (Fama, 1980, p. 292). In a third article, Jensen (1983, 1984) extended these ideas to controversial practices such as golden parachutes and corporate raiding and the important role that corporate governance mechanisms play in inhibiting self-serving bias.

Positivist research in agency theory serves an important purpose in that it provides great insight into human behavior (Arthurs & Busenitz, 2003). Jensen (1983) examined this same phenomenon and wrote that “answers to positive questions ... involve discovery of some aspect of how the world behaves and are always potentially refutable by contradictory evidence” (p. 320). For example, a positivist researcher would ask, “How does separation of ownership and control affect the value of a firm?”

This type of explanation is of importance to practitioners because it provides insight into how purchasing actions (the principal) can better influence the actions of the supplier (the agent). Specifically, Zsidisin and Ellram (2003) identified that for a purchasing organization (principal) to be successful, it needs to address the risks associated with its supply source (agent) and develop strategies to mitigate that risk in order to reduce the opportunities for the agent to demonstrate self-serving behavior.

Their research indicated that the inability of a supplier to consistently render the services (or provide the goods) required under the contract can cause significant problems for the firm itself and can eventually result in significant problems with downstream customers (Zsidisin & Ellram, 2003). As a result, if the firm possesses a greater awareness of the potential risks that are associated with any principal–agent agreement, they can make better decisions regarding its sourcing decisions.





## 8. Game Theory

The first ideas for game theory appeared in 1928 in a paper written by mathematician John von Neumann, who then published a book 16 years later that firmly established the field (Von Neumann & Morgenstern, 1953). Quade (1964) provided an excellent description of game theory, stating that it “is a mathematical treatment of planning under conflict” (p. 89). His 1964 work also highlighted that game theory “contributions to policy analysis are possibly far greater [than linear programming] for it tells us how to think about situations of conflict” (Quade, 1964, p. 89).

The classic, and most common, application of game theory is known as the “zero sum game.” This game takes place between two individuals (or players) and is visualized through a matrix. Each row of the matrix is representative of an action (or strategy) that Player 1 can make, and in a similar fashion, each column is representative of an action that Player 2 can make. Each of the entries in the matrix represents all of the possible payoffs to each of the players. The game receives its name, zero sum, from the fact that as one player gains a point, the other player loses a point in return (Major, 2003).

A key concept in game theory is the idea of the minimax criterion. The criterion essentially states that each player should work to minimize the value that represents the maximum amount that he or she stands to lose in the game as long as the other player cannot exploit this action for his or her gain (Major, 2003). This particular strategy is viewed as especially conservative and assumes that the other player will perform to the best of his or her ability while avoiding unnecessary risk. A potential problem arises when both players apply the minimax strategy, resulting in a phenomenon known as a “saddle point” (Quade, 1964). However, when the game does not result in a saddle point, the players may be better off adopting a series of varying strategies to reduce the likelihood that their opponent will guess their intentions (McCain, 1999). An added value of using a mixed strategy approach is



that it traditionally leads to a single solution in a shorter period of time (McCain, 1999).

Game theory becomes much more complex when more than two players exist, as well as when solutions exist that result in both players losing or winning (McCain, 1999). Additionally, in some games, players may cooperate by colluding to enhance the results by exchanging side-payments (also known as bribes) in order to influence the results in their favor. An important aspect of multi-player game theory is that it can be used to perform advanced analyses of the economic behavior of entire countries (McCain, 1999).

In a key example of the significance that game theory plays in the field of purchasing, research conducted by Krause, Terpend, and Petersen (2006) identified potential variables that may have an effect on buyer–supplier relationships in a two-party (two-player) environment. Their research indicated that predetermined reference points (best alternative to a negotiated agreement, market price, opening price, etc.) used in negotiations between the purchasing firm’s representative and potential suppliers can significantly influence the resulting contract award (Krause et al., 2006). This is a particularly important finding in that it confirms an often-used negotiation strategy as a valid premise and indicates that the success of a negotiation is positively linked to the level of effort exerted during the preparation stage (Krause et al., 2006).

## **9. Organizational Learning**

The field of organizational behavioral research gives credit to the work of Argyris (1977) for codifying the then fragmented concept of organizational learning into a substantive theory (Daft & Weick, 1984). Argyris (1977) defined organizational learning as “a process of detecting and correcting error. Error is for our purposes any feature of knowledge or knowing that inhibits learning” (p. 119). Argyris (1976) distinguished between two different levels of learning that he refers to as single- and double-loop learning, but today researchers do not make a distinction between





single- and double-loop learning in practice; they use the two different types of learning as shorthand to describe the learning as routine (single) or radical (double; Lämsä, 2008). While Argyris' work is considered seminal to the theory of organizational learning, the theory has since branched out into many different directions, and there is not a single model that has gained widespread acceptance (Fiol & Lyles, 1985).

Although there is some agreement that there is a difference between individual and organizational learning (Fiol & Lyles, 1985), the main debate surrounding organizational learning is whether the organization's knowledge is only the combined sum of what the individual members of the organization have learned or whether there is more to the organization's learning (Lämsä, 2008). Fiol and Lyles (1985) argued that not only the organization's systems but also its structures and procedures have an effect on an individual's learning. They added that the organization's learning is not just the combined sum of each individual's learning because unlike individuals, organizations create learning systems that influence the members and then transmit the learning to others through the organization's histories and norms (Fiol & Lyles, 1985).

Lämsä (2008) asserted that an organization's knowledge is created through both "continuous and dynamic interaction between tacit and explicit knowledge," (p. 32) which according to the cognitive approach is closely related to knowledge management. Recently, the debate between the cognitive or the behavioral view of organizational learning has subsided because researchers have started to use a wider definition of organizational learning irrespective of its focus on cognitive or behavioral views (Lämsä, 2008, p. 8). The differences between the branches of organizational learning theory are beginning to matter less and the focus is moving toward the study of how organizations manage and use their knowledge.

According to Daft and Weick (1984), the way an organization learns and stores knowledge is important because the organization must take information from its external environment and then filter and process the information to survive. In



order to be successful, once the organization has obtained the information it must develop mechanisms that can process it and detect “trends, events, competitors, markets, and technological developments” (Daft & Weick, 1984, p. 287).

By researching in the purchasing field, Carter (2005) found that organizational learning and supplier performance both act as key, mediating variables between purchasing social responsibility and costs. In Carter’s (2005) research he concluded that the integration of purchasing social responsibility, organizational learning, and supply chain management resulted in improved supplier performance, which in the end resulted in reduced costs for the purchasing organization.

## **10. Social Network Theory**

Social network theory originated out of the literature of the 1960s and 1970s that focused on the formation of relations among social service agencies, but it has since shifted focus to the relationships between business organizations (Gulati, 1998). The theory depicts these relationships through two lenses: nodes and ties. Nodes represent individual actors (which signify firms) within the network, and ties represent the relationships between the individual actors (Koufteros, Cheng, & Lai, 2007). There is no singular form of a tie. In fact, many different kinds of ties can exist simultaneously. Some ties can be weak and some can be strong, and at the same time, there can be both direct and indirect ties (Koufteros et al., 2007).

Borgatti and Foster (2003) documented the exponential growth in the volume of social network research from 1970–2000. They attributed the explosion of growth in organizational network research to the study of social capital, which analyzes the value of the connections in social networks (Borgatti & Foster, 2003). Once an organization is depicted in nodes and ties, it then can be “mapped” to create a social network diagram, which is a visual representation of the social network. This diagram can then be used to find the social capital of the specific actors, which is what gives the social networks their value through the cooperation and knowledge sharing of the actors (Inkpen & Tsang, 2005).



Bernardes and Zsidisin 2008) pointed out that the success of the working relationships between actors is determined by how much social capital they have built up during their commercial transactions. They also stated that “one of the central tenets of the social network literature is that socially embedded ties have the capacity to carry information that would otherwise be withheld and to impact norms of behavior” (Bernardes & Zsidisin, 2008, p. 213). This tenet is a very important aspect of social network theory and of the field of purchasing because of the strategic importance that information from the marketplace can provide. Purchasing professionals can use social network theory to better understand the interactions between organizations and the market in general because they are key boundary spanners between the buying organization and its supply base (Zhang, Viswanathan, & Henke, 2011).

Another area in which social network theory has provided significant contributions to the purchasing field is in the research conducted by Carter, Leuschner, et al. (2007), which analyzed the underlying social network found in the *JSCM* over a 40-year period. To provide a better understanding of buyer–supplier relationships, their research indicated that the same approach could be used

to map the interactions of supply management personnel to better comprehend relationships such as those between personal attributes and positions within an informal social network of a supply management organization, and centrality within a network and an employee’s influence and power. (Carter, Leuschner, et al., 2007, p. 25)

## G. Summary

In this chapter we synthesized each of the top 10 theories found in the purchasing field based on our extensive literature review of the top scholarly journals in the field of purchasing for the eight-year period of 2002–2009. In order to provide insight to both practitioners and academicians, we also explained the relevance and importance of each theory to the field of purchasing. In Chapter IV we analyze what the theory usage means to the purchasing field as well as provide an overall analysis of the journal articles we studied.



## IV. Analysis

### A. Overview

In this chapter we analyze the literature from the purchasing field and accomplish the following: (1) we determine the extent to which research in the purchasing field relies on theory; (2) we explore patterns and insights from knowledge producers and knowledge repositories using a social network analysis; and (3) we combine theoretical analysis with social network analysis to identify six best practices that can be used in federal procurement. A review of the methodology we used to determine the top scholarly journals in the field of purchasing and the theoretical classification effort we used can be found in Chapter II.

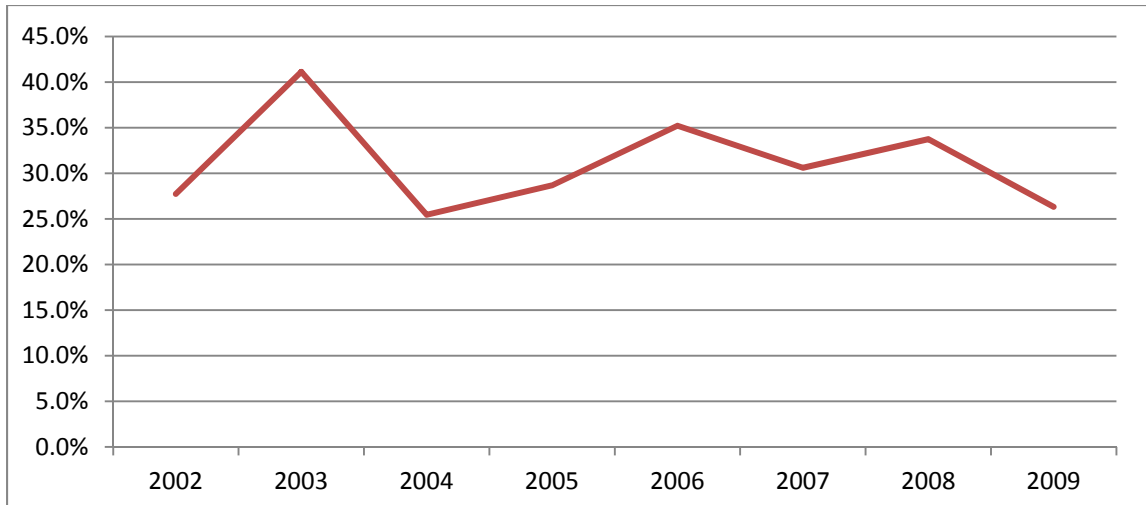
### B. Article Analysis

In this section we examine the 725 theory-based purchasing articles encountered during our research to see whether the numerous calls for an increase in theory-based research in the field of purchasing over the last 10 years have been answered (Carter & Ellram, 2003).

#### 1. Purchasing Articles

In order to determine the extent of theory use in the purchasing field of research, we first defined the field. We determined which of the articles from the eight journals discussed in Chapter II during the period of 2002–2009 were actually related to the field of purchasing and then included them in our theoretical analysis. Figure 3 shows the percentage of the articles that were included in the purchasing determination across the eight years of this study. On average, across the eight years and across all eight journals, we categorized 31% of the articles as purchasing. The number of articles we categorized as purchasing ranged from 26.3% to 41.1%.

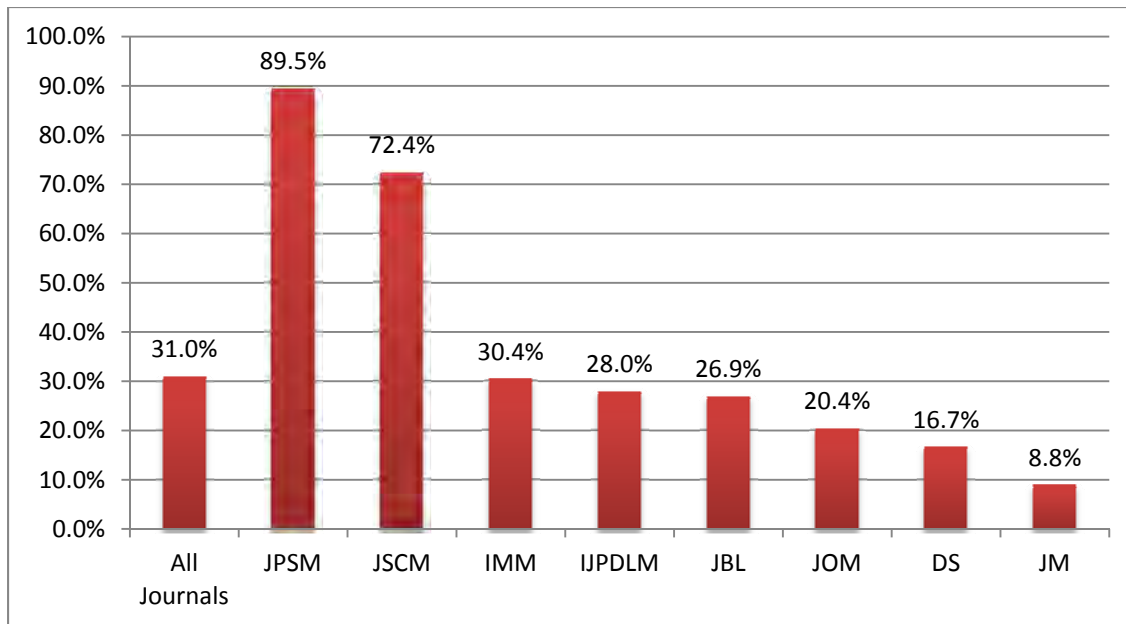




**Figure 3. Percentage of Articles in All Journals Categorized as Purchasing Articles by Year**

Although the average number of articles categorized as purchasing articles across all journals may appear low, this is due to large variations in the number of articles in the eight journals. Figure 4 breaks out the percentage of the articles that were included in the purchasing determination by journal for all eight years included in this study. Two journals are clearly the leaders in publishing purchasing-related articles. They are the *JPSM* with 89.5% of its articles categorized as purchasing and the *JSCM* with 72.4%. The remaining six journals are not as heavily focused on the purchasing field.

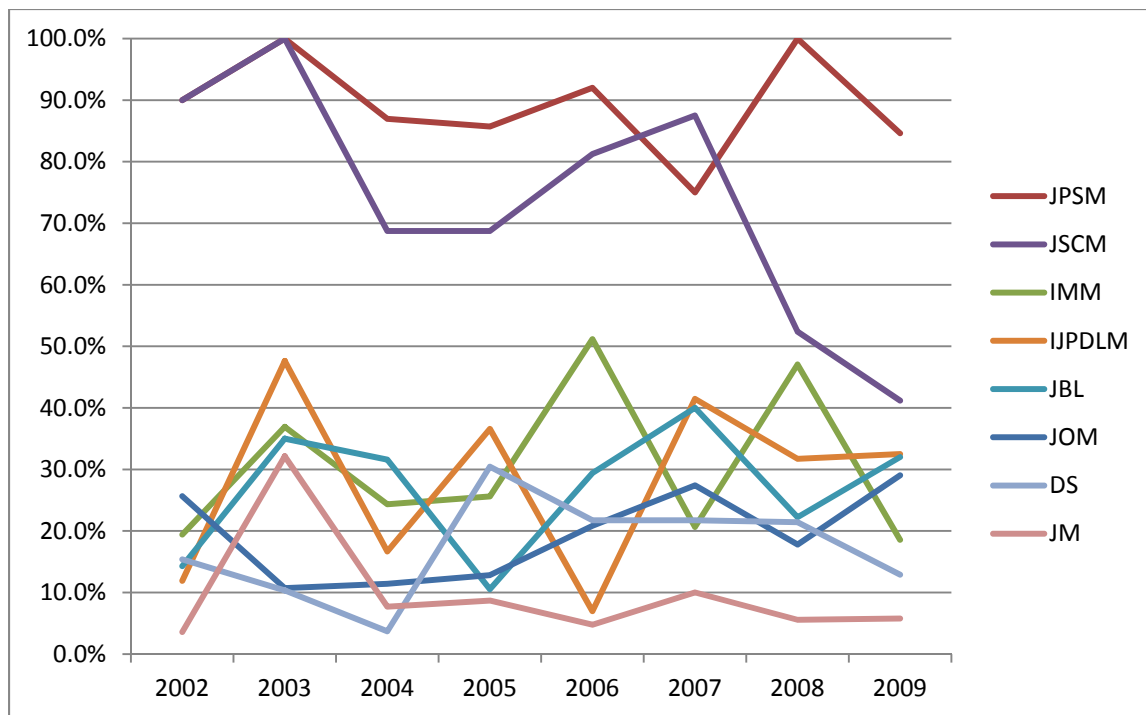




**Figure 4. Percentage of Articles Categorized as Purchasing Articles by Journal**

Figure 5 breaks out the results of the purchasing determination by journal across the eight years included in this study. Over the last two years of this study there was a sharp decrease in the number of purchasing-related articles from the *JSCM*. This was a result of the change in editorial staff of the journal, whose goal was to make *JSCM* “the journal of choice among supply chain management scholars across disciplines” (Carter, Ellram, & Kaufmann, 2008, p. 5), taking the journal away from its traditional purchasing roots. The new editors created an advisory board for the journal that represents not only traditional backgrounds in supply chain management but also backgrounds in overlapping and highly related fields (Carter, Ellram, et al., 2008).





**Figure 5. Percentage of Articles Categorized as Purchasing Articles by Journal by Year**

## 2. Theory Use in the Purchasing Articles

After we made the determination as to whether an article constituted a *purchasing* article, we then conducted a content analysis on the 725 purchasing-related articles to determine whether each article used Hunt's (2002) definition of theory, which is a construct that is able to both explain and predict phenomena and to differentiate theory-based efforts from those that are atheoretical in nature. This definition is critical to our research because theory is essential to furthering scientific understanding through the creation of constructs that are capable of both explaining and predicting phenomena (Hunt, 1991).

To determine whether the numerous calls for an increase in theory-based research in the field of purchasing over the last 10 years (Carter & Ellram, 2003) had been addressed, we established in our research a baseline period (2002–2005) to determine the level of theory-based research prior to the calls. After the baseline



was established, we employed the same methodology to evaluate articles from 2006–2009, known as the “inquiry” period, to determine whether an increase in theory-based research had actually occurred.

Table 5 indicates that there was an increase in the number of purchasing articles using theory from the baseline period to the inquiry period of 45.9% up to 51.2%. On the same note, the average number of theoretical incidences also increased from the baseline to the inquiry period, going from 1.18 to 1.26 theories per article. This potentially represents a significant increase in both the use and breadth of theory in purchasing research.

**Table 5. Average Percentage of Purchasing Articles Using Theory and Average Number of Theoretical Incidents per Article during the Periods**

Period	% Theory Use	# of Theoretical Incidences per Article
Baseline (2002–2004)	45.9	1.18
Inquiry (2005–2009)	51.2	1.26

To verify that an increase in theory use actually occurred, we conducted several statistical analyses. In all of the statistical analyses we conducted, we used the baseline and inquiry periods as the samples. For the purposes of hypothesis testing, the inquiry period served as Sample 1, and the data from the baseline period served as Sample 2. Using this method, the difference between the two (if positive) would potentially indicate that an increase in theory use had in fact occurred.

#### **a. Statistical Analysis of Overall Theory Use**

The first statistical analysis we conducted was on the overall theory use percentage for purchasing-related articles within all eight journals encompassing 2002–2009. Because theory use was either present or absent in each article, the data on theory use is of a nominal nature. This data is also proportional because its value is representative of the occurrence of theory use in the purchasing articles. Given that the theory use data is both nominal and proportional, the appropriate test





statistic was the z test. As previously indicated, the inquiry period served as Sample 1 and the data from the baseline period served as Sample 2. Because we were dealing with proportions for this test statistic, we defined the samples as follows:

$$\hat{P}_1 = P_1 = \text{Inquiry Period Sample Proportion}$$

$$\hat{P}_2 = P_2 = \text{Baseline Period Sample Proportion}$$

Our null hypothesis ( $H_0$ ) specified that  $H_0: (P_1 - P_2) = 0$ . This meant that we assumed there was no change in the overall use of theory between the baseline and inquiry periods. Our alternative hypothesis ( $H_1$ ) specified that  $H_1: (P_1 - P_2) > 0$ . This meant that if we rejected the null hypothesis in favor of the alternative hypothesis, we inferred that an increase in theory use occurred. Using the test statistic shown in Figure 6 along with the theory use data from each of the samples, we conducted our analysis. The significance level for this research was selected to ensure that the results would be both marginally significant, and that the probability of committing a Type I error (rejecting the null hypothesis where the null hypothesis is true) would be reduced. Utilizing a 10% significance level, we generated the summary statistics shown in Table 6.



**Table 6. z Test Summary Statistics**

<b>z Test: Two Proportions</b>		
	Baseline Data	Inquiry Data
Sample Proportions	0.4585	0.5175
Observations	325	400
Hypothesized Difference	0	
z Stat	1.5814	
P(Z ≤ z) one tail	0.0569	
z critical one-tail	1.2816	

The summary statistics shown in Table 6 indicate that the rejection region for  $H_0$  at a 10% significance level is  $z > 1.2816$ . The  $z$  value calculated for this statistic was  $z = 1.5814$ . Because  $z = 1.5814 > 1.2816$ , and the  $p$  value of  $0.0569 < 10\%$  significance level, the results were marginally significant and we rejected the null hypothesis in favor of the alternative. This allowed us to infer that the overall use of theory in purchasing research increased during the inquiry period when compared to the baseline period.

#### **b. Theoretical Incidence Analysis**

In the previous statistical analysis, we focused on whether the overall use of theory increased from the baseline to the inquiry period; however, for the analysis in this section, we focus on determining whether an increase in the average number of theoretical incidences occurred between the baseline and inquiry periods. As indicated in Table 5, it appears that the average number of theories found in articles that utilized purchasing research increased from 1.18 theories per article in the baseline period to 1.26 theories per article in the inquiry period. To verify whether an increase actually occurred, we completed a series of calculations.

The first step in our analysis was to determine the type of data we were using. Because we counted the number of theories found in each article, our data was interval in nature. The next step was to determine whether the sample was normally distributed; however, because our sample size was so large, it was not necessary



for us to verify the distribution; the large size of the sample compensated for any discrepancies (Keller, 2009). To determine which  $t$  test was the best fit for our analysis, we first had to determine whether the variances ( $s^2$ ) of the two samples were equal or unequal. Utilizing an  $F$  test and estimating the ratio of the two variances, we calculated the test statistics to determine whether the variances were equal. As previously indicated, the inquiry period served as Sample 1 and the data from the baseline period served as Sample 2.

Our null hypothesis ( $H_0$ ) for the  $F$  test specified that  $H_0: (\mu_1 - \mu_2) = 0$ . This meant that we assumed the variances of the two samples were equal. Our alternative hypothesis ( $H_1$ ) specified that  $H_1: (\mu_1 - \mu_2) \neq 0$ . This meant that if we rejected the null hypothesis in favor of the alternative hypothesis, we inferred that the variances of the two samples were unequal. The summary statistics for the  $F$  test are shown in Table 7.

**Table 7.  $F$  Test Summary Statistics**

<b><i>Two-Sample <math>F</math> Test for Variances</i></b>		
	Inquiry Data	Baseline Data
Mean	1.255	1.184615385
Variance	0.436065163	0.237416904
Observations	400	325
$df$	399	324
$F$	1.836706466	
$P(F \leq f)$ one-tail	8.50349E-09	
$F$ critical one-tail	1.146131084	

The test statistic shown in Table 7 is  $F = 1.836$ . The rejection region, given the 10% significance level and the degrees of freedom shown, was  $F > 1.1461$ . Because  $F = 1.836 > 1.1461$ , and the  $p$  value of  $8.50349E-09 < 10\%$  significance level, the results were marginally significant and we rejected the null hypothesis in favor of the alternative. This allowed us to infer that the variances of the inquiry and the baseline periods differed. Because the variances were unequal, we used the unequal variances  $t$  test of two samples to determine whether a change in the average number of theoretical incidences occurred.



As previously indicated, the inquiry period served as Sample 1, and the data from the baseline period served as Sample 2. Because we were dealing with means for this test statistic, we defined the samples as follows:

$$\mu_1 = \bar{x}_1 = \text{Inquiry Period Sample Proportion}$$

$$\mu_2 = \bar{x}_2 = \text{Baseline Period Sample Proportion}$$

Our null hypothesis ( $H_0$ ) specified that  $H_0: (\mu_1 - \mu_2) = 0$ . This meant that we assumed there was no change in the average number of theoretical incidences between the baseline and inquiry periods. Our alternative hypothesis ( $H_1$ ) specified that  $H_1: (\mu_1 - \mu_2) > 0$ . This meant that if we rejected the null hypothesis in favor of the alternative hypothesis, we inferred that an increase in the average number of theoretical incidences occurred. Utilizing a 10% significance level, we generated the summary statistics shown in Table 8.

**Table 8.  $t$  Test Summary Statistics**

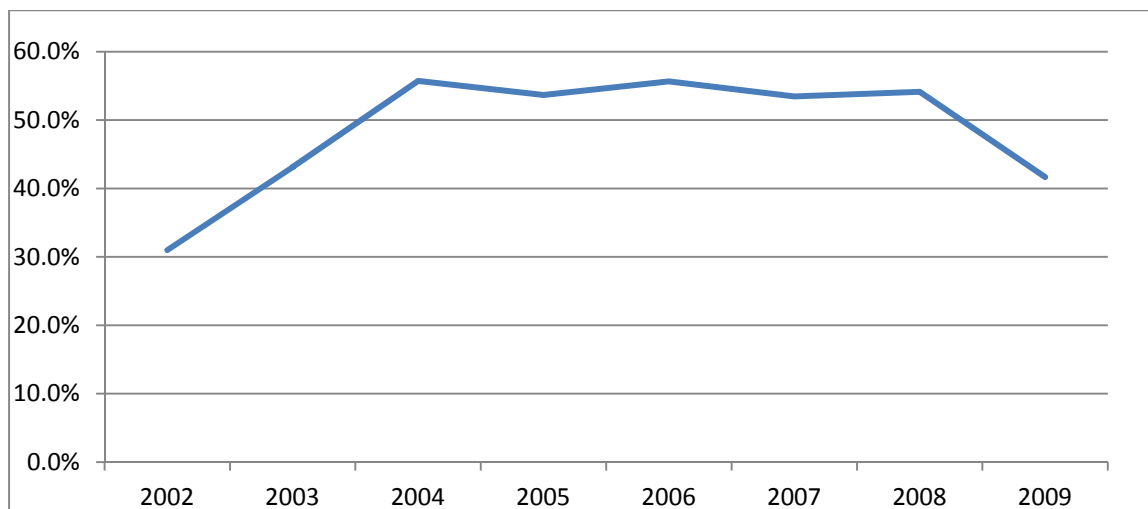
<b><i>Two-Sample <math>t</math> Test Assuming Unequal Variances</i></b>		
	Inquiry Data	Baseline Data
Mean	1.255	1.184615385
Variance	0.436065163	0.237416904
Observations	400	325
Hypothesized Mean Difference	0	
<i>Df</i>	717	
$t$ Stat	1.649534311	
$P(T \leq t)$ one-tail	0.04973811	
$t$ critical one-tail	1.282733409	

The test statistic shown in Table 8 is  $t = 1.6495$ . The rejection region, given the 10% significance level and the degrees of freedom shown, was  $t > 1.2827$ . Because  $t = 1.6495 > 1.2827$  and the  $p$  value of  $0.0487 < 10\%$  significance level, we rejected the null hypothesis in favor of the alternative. This meant that we inferred there was change in the average number of theoretical incidences between the baseline and inquiry periods.



### c. Theory Use in the Analysis of the Purchasing Articles

Based on our statistical analysis in Section b, we can infer the overall use of theory in purchasing research increased during the inquiry period when compared to the baseline period. In this section, we analyze the increase of theory use across the eight top journals. Out of the 725 articles classified as purchasing articles, we classified 356 (49.1%) as being theory-based. Figure 6 shows a sharp increase in the percent of purchasing articles that used theory over the first three years of the study period, 2002–2004, from 31% to 56%. In the subsequent four years, 2005–2008, theory use remained roughly constant at around 55%. In the final year of the study period, 2009, there was a sharp drop to 42%. Although there was an upward trend from the baseline period to the inquiry period, the sharp drop in the final year of the study is of note.

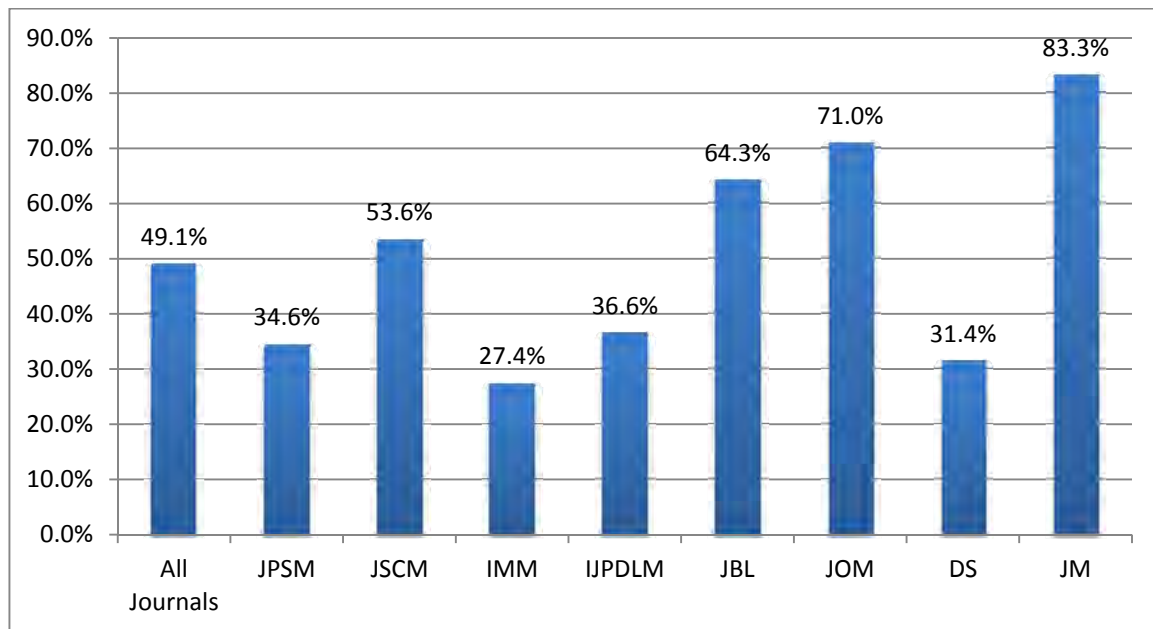


**Figure 6. Percentage of Purchasing Articles Using Theory by Year**

On average, around half of the purchasing articles used theory, but the amount by journal varied considerably. Figure 7 shows the percentage of purchasing articles that used theory by journal across all eight years of the study period. It should be noted that the rate for theory use only includes the articles that we categorized as purchasing and does not necessarily represent theory use for all the articles in a given journal. The journals remain in order of rank by the number of



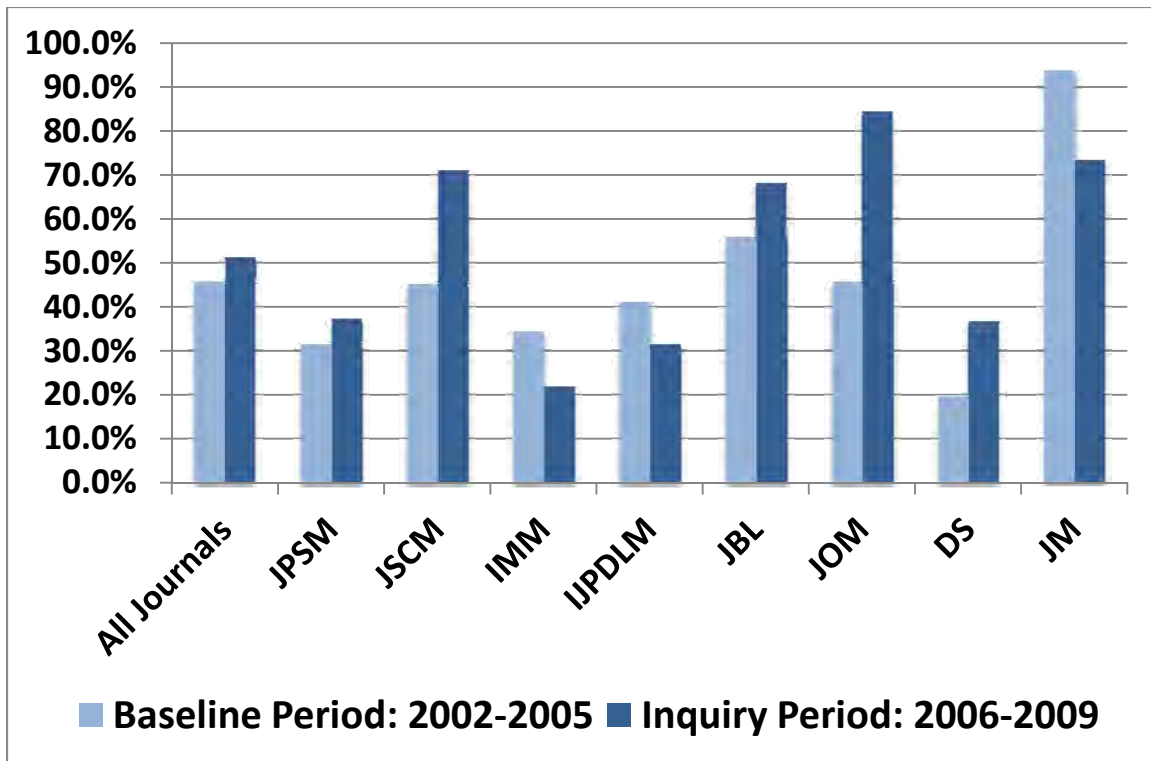
purchasing articles they published, with *JPSM* publishing the highest percentage of purchasing-related articles and *JM* publishing the smallest percentage.



**Figure 7. Theory-Based Purchasing Articles (2002–2009)**

Figure 8 shows how the number of purchasing articles that used theory for each journal changed from the baseline period to the inquiry period. Five of the journals (*JPSM*, *JSCM*, *JBL*, *JOM*, and *DS*) increased the percentage of theory articles they published, while three journals (*IMM*, *IJPDLM*, and *JM*) decreased the percentage of theory articles they published. It should be noted that the two international journals both decreased the percentage of theory articles they published.

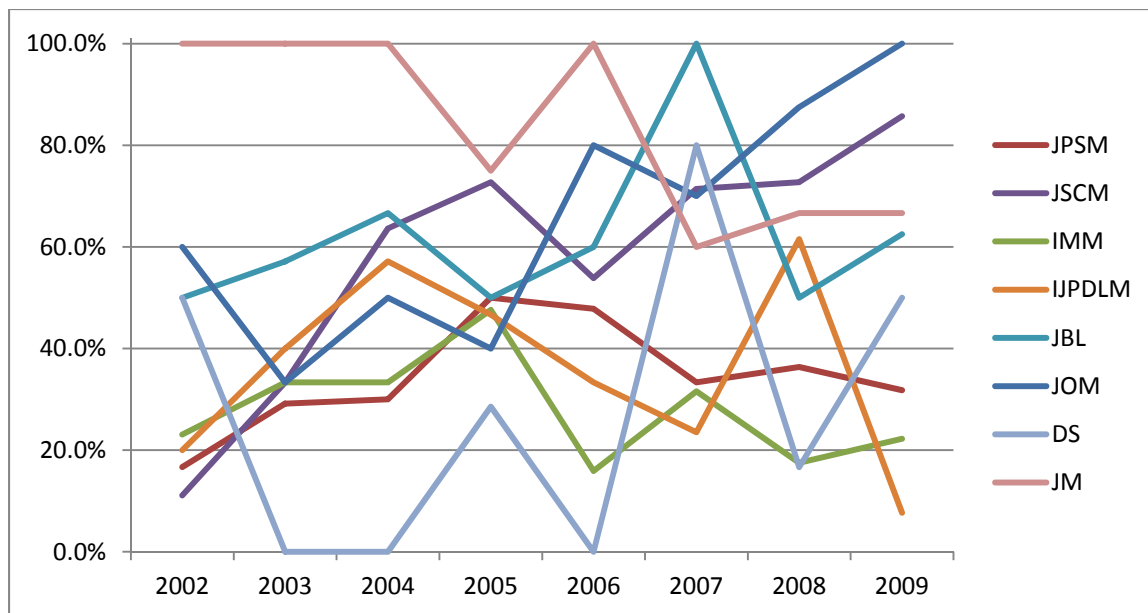




**Figure 8. Percentage of Purchasing Articles Using Theory by Journal for Baseline and Inquiry Periods**

Figure 9 shows the percentage of purchasing articles that used theory for all eight of the top journals and for all the years of the study period. This figure shows the direction in which each journal is trending in greater detail than does Figure 8. Because of the large amount of data represented in Figure 9, we broke down the data for each of the top eight journals into separate graphs, which can be found in Appendix B.





**Figure 9. Percentage of Purchasing Articles Using Theory by Journal and by Year**

Table 9 is a breakdown of the top 10 theories for all eight years we studied for each of the top eight journals. Out of the 356 purchasing articles that we classified as being theory-based, we recorded a total of 528 theoretical incidents, including 123 unique theories. This is a very high number of unique theories and may suggest that the purchasing field is very fragmented in its use of theory. Relationship marketing theory received a boost to its ranking from high use in the *JM* and *IMM*, while *DS* gave agency theory and game theory a boost in its ranking.

**Table 9. Percent Use for Top Ten Theories for All Years by Journal**

Theory	JPSM (%)	JSCM (%)	IMM (%)	IJPDLM (%)	JBL (%)	JOM (%)	DS (%)	JM (%)
TCE	23.1	17.6	11.1	12.0	17.1	18.0	7.7	13.9
RBV	9.0	5.4	8.5	10.0	8.6	11.2	7.7	5.6
Social Exchange Theory	2.6	6.8	6.5	2.0	5.7	6.7	0.0	5.6
Relationship Marketing	0.0	2.7	10.5	2.0	0.0	0.0	0.0	11.1
Contingency Theory	12.8	6.8	1.3	0.0	0.0	3.4	7.7	0.0
Resource Dependence Theory	3.8	6.8	3.3	2.0	2.9	2.2	0.0	2.8
Agency Theory	1.3	6.8	0.7	4.0	2.9	2.2	23.1	2.8
Game Theory	3.8	1.4	0.7	8.0	0.0	2.2	30.8	0.0
Organizational Learning	0.0	1.4	3.3	2.0	2.9	2.2	0.0	5.6
Social Network Theory	1.3	2.7	3.9	2.0	2.9	1.1	0.0	0.0





### C. Social Network Analysis

We conducted a social network analysis utilizing a subset of 725 articles from the 2,338 articles we reviewed. These 725 articles consisted of those we identified as being purchasing related, per the examination we conducted in Chapter III. We utilized this subset to ensure that the results we obtained from our analysis were germane to purchasing alone.

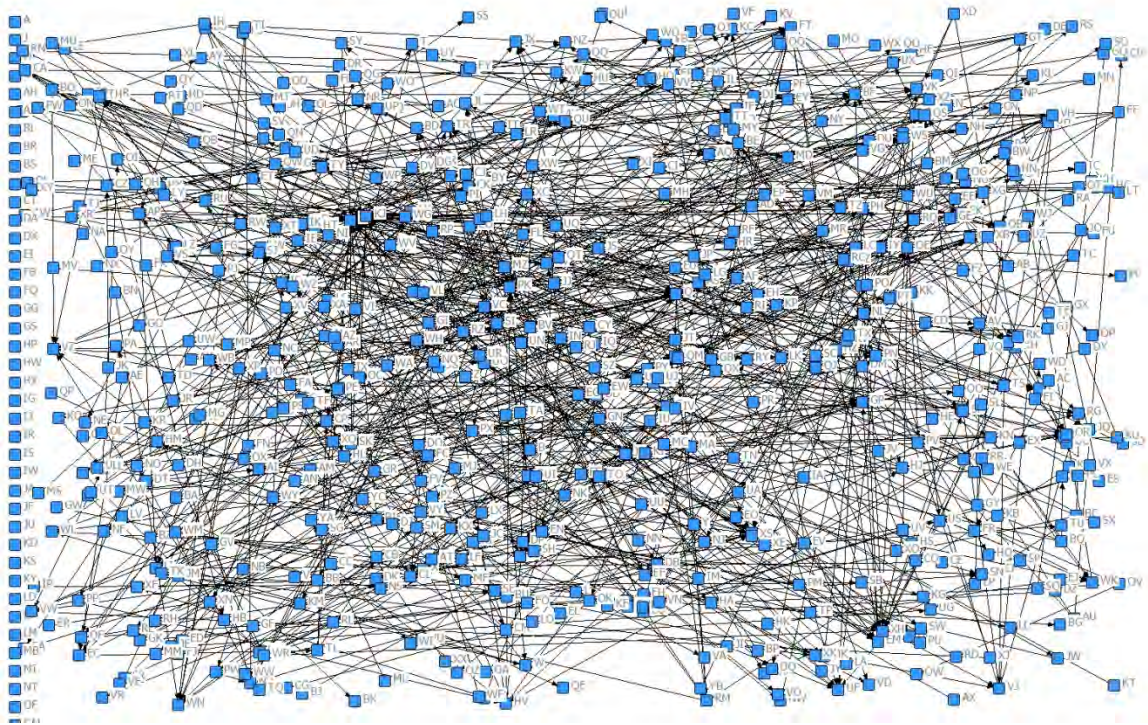
As mentioned in Chapter II, we constructed a 653 by 653 cell matrix to perform the social network analysis. The reason for the matrix's size was that it had to encompass all possible relationships between each of the institutions. This meant that every university or institution listed for the authors of the articles we analyzed as either an employer or a source of education had to be included on both sides of the matrix to ensure that it was symmetrical. This matrix served as the template in which we populated several samples of the data to analyze the social network trends. For example, the baseline period sample encompassed all of the affiliation information for all purchasing articles from our data set during the period 2002–2005. We utilized the following samples:

- a baseline period (2002–2005),
- an inquiry period (2006–2009), and
- the full sample (2002–2009).

We used Microsoft Excel to mine the data and create sample matrices for each of the three sample periods. Then, we uploaded these matrices into UCINET 6. Each of the matrices was decomposed utilizing the software package provided through UCINET 6.



The next step in the social network analysis was to create the matrix for the full sample in a sociogram so that we could ascertain the true size of the network. To accomplish the visualization, we used NetDraw, which is a subcomponent of UCINET 6. This visualization is depicted in Figure 10.



**Figure 10. Data Set Visualization for the Full Sample**

Because of the jumbled nature of the raw data from the whole data, the interpretations that we can make from this figure are limited. We can gauge a crude estimation of the universities of importance to the purchasing field by identifying which universities or institutions are located closest to the center of the areas of the visualization that are the “darkest” due to the number of paths that cross through those particular points. To assist in the interpretation and streamlining of the data, we employed several analytical tools for each of the matrices: the Freeman’s degree centrality measure and the Freeman betweenness centrality measure.



The Freeman degree centrality measure possesses two measurements: *in-degree* and *out-degree*. In the context of our research, this means that a university that received many connections (or ties) from other universities or institutions is prominent and has high prestige (Hanneman & Riddle, 2005), indicating that it possesses a high in-degree since other institutions may view it as important and may seek out connections to it (Hanneman & Riddle, 2005). The other side of the degree centrality measure is those universities or institutions that possess a high out-degree. These are universities or institutions that we observed to be more influential in their field and to demonstrate an ability to exchange ideas with many others within their field (Hanneman & Riddle, 2005). The Freeman centrality measure is important to our research in that it reveals this situation statistically and provides a list of the most influential institutions in descending order (Hanneman & Riddle, 2005).

For the purpose of this research, the in-degree, which is the sum of the values present in the adjacency matrix for each institution's respective column, is a numerical indication of how many times articles were drafted by graduates of that particular institution. The out-degree, which is the sum of the values present in the adjacency matrix for each institution's respective row, is a numerical representation of the institution's relative publishing capability. High values of in-degree and out-degree indicate that the institution is influential. To interpret these values, it is necessary to normalize the degree values (Freeman, 1979).

When calculating the degree centrality measures, it was necessary to utilize the concept of bounded rationality because it would have been impossible for us to make recommendations to partner with the full list of 653 institutions; as a result, we reduced the list to include the top 25 institutions that demonstrated the relatively highest in-degree or out-degree values (or both). We repeated this methodology for all three of the samples (baseline, inquiry, and full) and the results are shown in Table 10.



**Table 10. Degree Centrality Measures of Purchasing Articles**

	2002 - 2009				2002 - 2005				2006 - 2009			
	Full Sample				Baseline Sample				Inquiry Sample			
University	Out-Degree	(Ranking)	In-Degree	(Ranking)	Out-Degree	(Ranking)	In-Degree	(Ranking)	Out-Degree	(Ranking)	In-Degree	(Ranking)
Michigan State University	0.47	1	0.736	1	0.358	1	0.545	1	0.479	1	0.767	1
Arizona State University	0.44	2	0.593	2	0.358	2	0.443	2	0.422	2	0.613	2
University of Nevada	0.174	3	0	18	0.119	4	0	16	0.192	8	0	19
University of Tennessee	0.174	4	0.194	5	0.119	7	0.102	5	0.192	6	0.249	4
University of Miami	0.164	5	0	19	N/R		N/R		0.249	3	0	16
Ohio State University	0.153	6	0.511	3	0.136	3	0.392	3	0.134	16	0.518	3
North Carolina State University	0.153	7	0	20	0.085	11	0	19	0.192	7	0	18
Open University of The Netherlands	0.133	8	0	21	0.085	17	0	21	0.153	11	0	21
University of Western Ontario	0.123	9	0.102	9	0.085	12	0.153	4	0.134	14	0.019	13
Georgia State University	0.123	10	0.092	12	N/R		N/R		0.192	5	0.096	8
University of North Florida	0.112	11	0.01	15	N/R		N/R		0.192	4	0	17
University of Manchester	0.112	12	0.112	8	0.085	15	0.102	7	0.115	18	0.096	9
Western Michigan University	0.102	13	0.01	16	0.119	6	0	17	N/R		N/R	
WHU – Otto Beisheim Graduate School of Management	0.102	14	0.01	17	N/R		N/R		0.115	20	0.019	14
University of North Carolina at Charlotte	0.092	15	0	22	N/R		N/R		0.134	17	0	23
Chalmers University of Technology	0.092	16	0.02	14	N/R		N/R		0.153	10	0.038	11
Colorado State University	0.092	17	0	23	N/R		N/R		0.153	9	0	20
Eindhoven University of Technology	0.092	18	0.143	6	0.085	14	0.102	6	N/R		N/R	
Texas Christian University	0.082	19	0	24	N/R		N/R		0.134	15	0	22
University of Toledo	0.082	20	0.102	10	0.119	5	0.085	8	N/R		N/R	
Pennsylvania State University	0.082	21	0.102	11	N/R		N/R		0.134	12	0.038	12
Texas A&M University	0.072	22	0.123	7	0.068	23	0.051	12	N/R		N/R	
Cleveland State University	0.072	23	0.072	13	N/R		N/R		0.096	23	0.096	10
Helsinki University of Technology	0.072	24	0	25	0.085	13	0	20	N/R		N/R	
Indiana University	0.072	25	0.266	4	N/R		N/R		0.134	13	0.249	5

The Freeman betweenness centrality measure is an important complement to the Freeman degree centrality measure (Freeman, 1979). Use of the betweenness centrality tool allowed us to measure and determine which universities or institutions were the most involved in the network. This measurement does not take into



account which direction the connection is in; it simply measures non-directional ties to determine how many relationships in which each university or institution is involved. Social networking literature implies that a central actor (one with high betweenness centrality) is one that is “involved in many non-directional ties” (Wasserman & Faust, 1994, p. 225). The idea of bounded rationality plays a significant role in this measurement. In a similar fashion to the manner in which in- and out-degree centrality was tabulated, we generated a top 25 list that included the universities or institutions that possessed the highest betweenness centrality measures. We repeated this methodology for all three of the samples (baseline, inquiry, and full) and the results are shown in Table 11.





**Table 11. Betweenness Centrality Measures of Purchasing Articles**

	2002 - 2009		2002 - 2005		2006 - 2009	
	<u>Full Sample</u>		<u>Baseline Sample</u>		<u>Inquiry Sample</u>	
University	Betweenness	(Ranking)	Betweenness	(Ranking)	Betweenness	(Ranking)
Michigan State University	3.476	1	0.332	1	0.588	1
McGill University	1.92	2	N/R		N/R	
Queen's University	1.896	3	N/R		N/R	
University of Melbourne	1.822	4	N/R		N/R	
Ohio State University	1.796	5	0.2	3	0.353	2
University of Manchester	1.77	6	0.042	8	N/R	
University of Bath	1.713	7	N/R		N/R	
Norwegian School of Economics and Business Administration	1.424	8	0.016	23	N/R	
Norwegian Business School	1.4	9	N/R		N/R	
University of Uppsala	1.395	10	0.017	21	N/R	
Arizona State University	1.342	11	0.237	2	0.329	3
Chalmers University of Technology	1.144	12	N/R		N/R	
University of Tennessee	1.105	13	0.132	5	0.077	9
Lund University	1.013	14	N/R		0.029	21
University of Arkansas	0.712	15	0.174	4	N/R	
Pennsylvania State University	0.667	16	0.018	17	0.027	23
Indiana University	0.551	17	N/R		0.147	4
Clemson University	0.495	18	N/R		0.029	20
University of Minnesota	0.366	19	N/R		0.103	7
Erasmus University	0.309	20	0.023	14	N/R	
University of Maryland	0.305	21	N/R		0.119	6
Texas A&M University	0.276	22	0.057	7	0.054	14
Monash University	0.254	23	N/R		N/R	
Georgia State University	0.245	24	N/R		0.101	8
Iowa State University	0.241	25	N/R		0.134	5



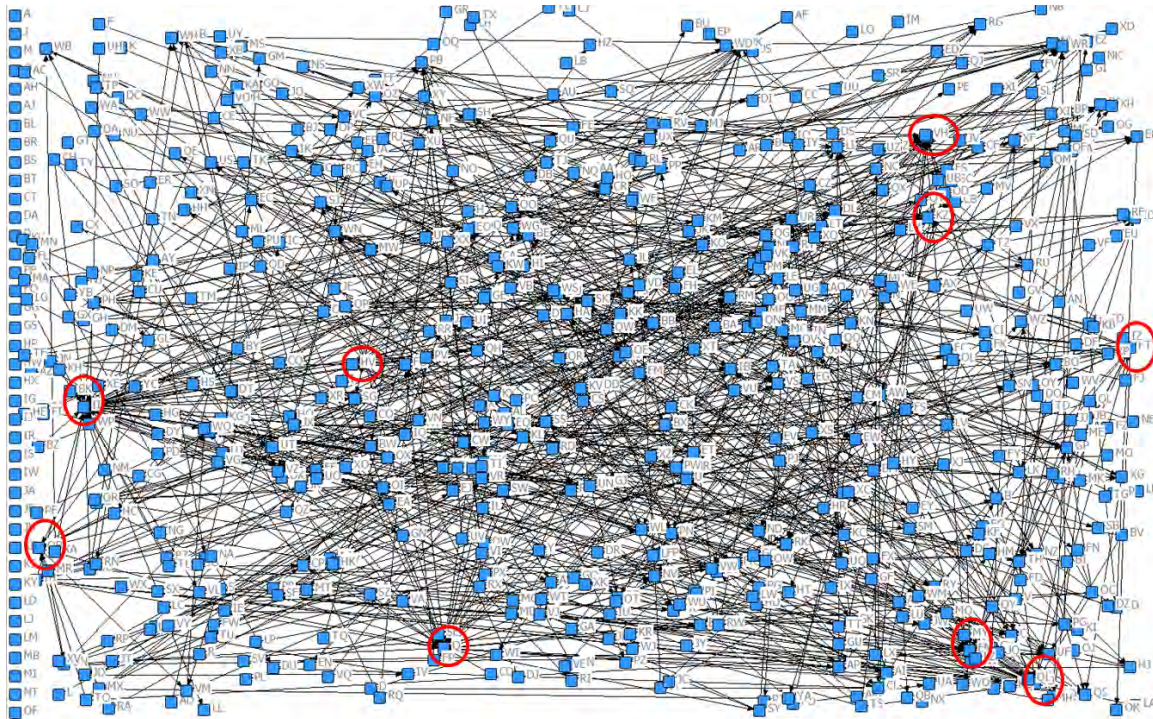
The normalized Freeman centrality and betweenness measures for all three matrices demonstrated that the majority of ties were located among the top 25 institutions for each of the three matrices. Nine universities were common to both top 25 lists. This indicates that these nine universities excel in producing purchasing research (high in-degree centrality), in educating purchasing researchers (high out-degree centrality), and in demonstrating an overall high level of influence as a result of their frequent involvement in the purchasing research network (high betweenness centrality). A list of these nine institutions can be found in Table 12, along with their individual normalized scores compared to the full sample set.

**Table 12. Top Nine Universities With the Highest Centrality Scores**

		2002 - 2009		2002 - 2009			
		Full Sample		Full Sample			
University Coding	University	Betweenness	(Ranking)	Out-Degree	(Ranking)	In-Degree	(Ranking)
II	Michigan State University	3.476	1	0.47	1	0.736	1
KJ	Ohio State University	1.796	2	0.153	6	0.511	3
HV	University of Manchester	1.77	3	0.112	12	0.112	8
Q	Arizona State University	1.342	4	0.44	2	0.593	2
VH	University of Tennessee	1.105	5	0.174	4	0.194	5
KZ	Pennsylvania State University	0.667	6	0.072	22	0.123	7
FT	Indiana University	0.551	7	0.072	25	0.266	4
OB	Texas A&M University	0.276	8	0.072	22	0.123	7
EM	Georgia State University	0.245	9	0.123	10	0.092	12



After narrowing the data set down to the two top 25 lists, we can go back to the original jumbled diagram (Figure 10) and highlight the nodes that represent the top nine universities identified in Table 12. The revised diagram, with the highlighted nodes, is located in Figure 11.

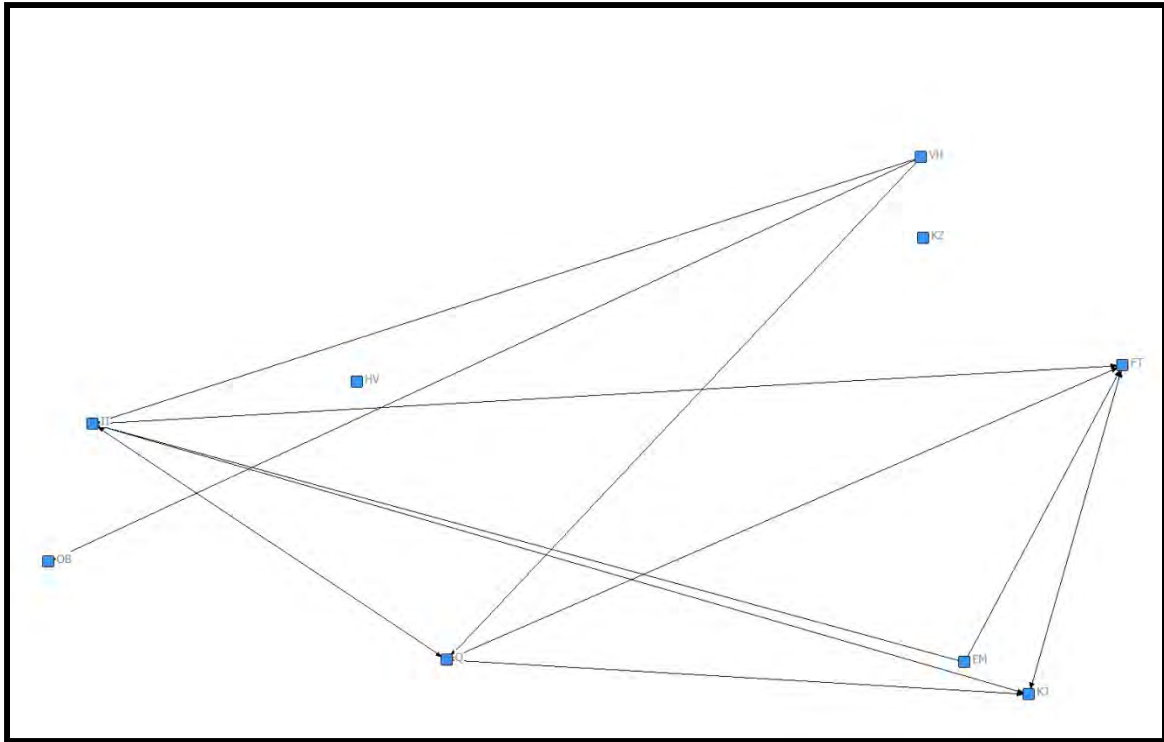


**Figure 11. Top Nine Universities Identified in Full Sample Data Set Visualization**

Figure 11 provides some additional clarification as to the centers of purchasing knowledge production; however, the display is still extremely cluttered. The next step in cleaning up the visualization was to remove the nodes (universities) that were not among the top nine identified in Table 12 so that the links between the top nine could be clearly visualized. While the removal of the other 644 nodes reduced the total number of connections displayed in the visualization, the result is a much clearer presentation that unclutters the diagram and reveals the universities that are truly the most influential in the network and those that present the greatest potential for benefit to federal procurement. Figure 12 shows the visualization containing only the top nine universities.



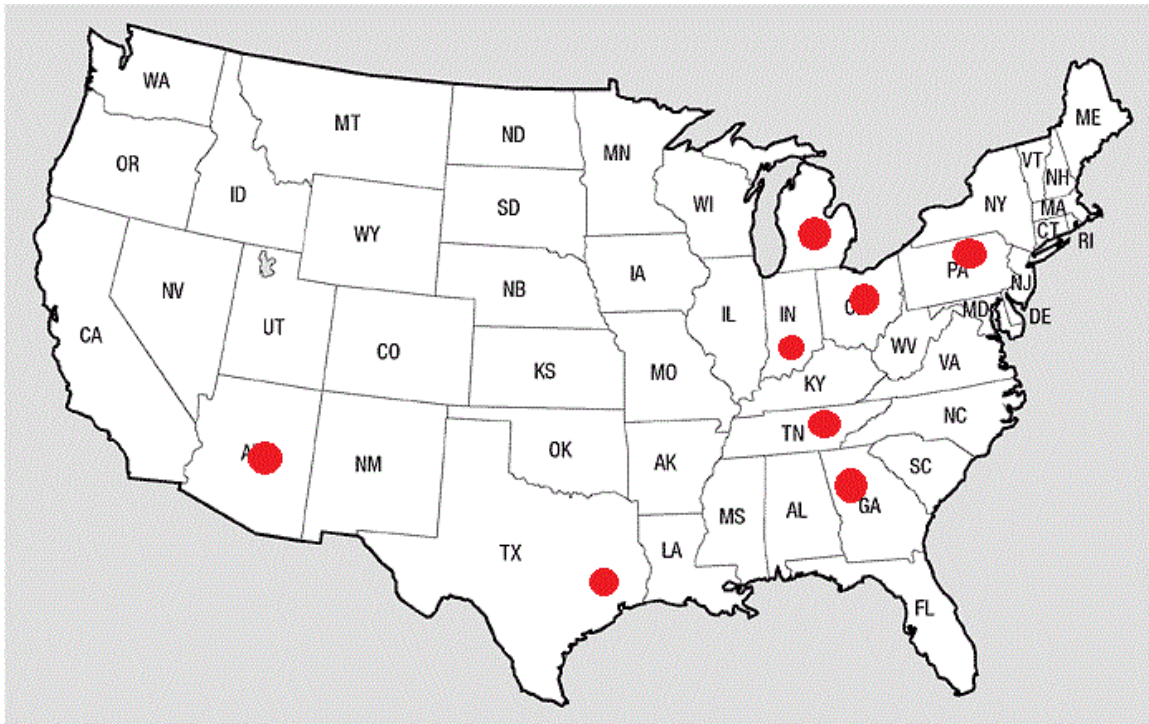




**Figure 12. Top Nine Universities Identified in Full Sample Data Set Visualization**

The final step in this process was to identify all of the top nine universities on a map so that we could geographically identify those with the highest likelihood of being utilized by federal procurement (see Figure 13). Because the bulk of the federal government's purchasing efforts are located within the continental United States, the likelihood of a partnership being formed between the U.S. government and a foreign university is significantly lower than a partnership being formed between the U.S. government and a stateside university. As a result, the University of Manchester was not included on the map. The map shown in Figure 13 represents the locations of the eight universities that represent the greatest potential for a partnership with federal procurement centers. Identification of these centers of excellence in purchasing research and education using the social networking analysis allowed us to make recommendations for the use of this data to improve the federal government's purchasing efforts. These recommendations can be found in Chapter V.





**Figure 13. Map of United States With Top Purchasing Institutions Identified**

#### D. Best Practices Analysis

In Chapter II, we defined a best practice as “a procedure, a process, or a system that can have a noticeable long-term positive impact on the objectives of your purchasing organization” (O’Reilly, 2008, p. 1). In this section, we examine those industry best practices (from both the public and private sectors) that aligned with the top theories and universities we uncovered during the course of our research. Specifically, during our interactions with purchasing professionals at the NCMA World Congress 2011 in Denver, Colorado, and after completing an extensive purchasing literature review, we encountered six best practices that demonstrate great potential to improve the federal government’s procurement practices.

##### 1. Michigan State University Partnership

As a federal agency, the U.S. Department of Veterans Affairs (VA) “spends half its budget acquiring goods and services” (Ambit Group, 2011, p. 97) through



contracted suppliers. The VA recognized that, as part of a comprehensive assessment of its Office of Acquisition and Logistics, its procurement workforce lacked the necessary knowledge and skill set to contract effectively with industry. This manifested itself through a series of problems at its acquisition centers, resulting in a degradation of its supplier relationships. To address these concerns and to establish practices that would not only correct the short-term problem but also prevent its reoccurrence in the future, the VA formed a partnership with industry and Michigan State University (MSU).

**a. Best Practices**

In this partnership, we identified several best practices that take the form of four separate but highly integrated activities. The following paragraphs list and discuss the four activities in which the VA is engaged.

(1) MSU Supplier Perception Survey. The first activity is a supplier perception survey (SPS) of stakeholders' perceptions regarding the VA's acquisitions performance. SPSs are used by major corporations, such as Sara Lee, to provide suppliers an opportunity to assess the buyer. In Sara Lee's case, the assessment is used to measure the supplier's view on the buyer's "quality philosophy, approach to purchasing agreements, delivery and inventory methods, commitment to the relationship, and willingness to buy based on value rather than cost" (Laseter, 1998, p. 12).

Research conducted by Sandor (2010) linked lower total operating cost with better supplier relationships. Laseter (1998) indicated that "effective relationships are built on goal congruence, mutual dependence, and knowledge of the supplier's competency," and that the SPS offers a way to sustain that buyer-supplier relationship "through extensive two-way communications about performance expectations" (p. 12). Supplier perception surveys, which were pioneered by Motorola, were later improved by Solectron and Honda (Nelson, Moody, & Stegner, 2001). These companies showed how supplier perception surveys improved



communication and built trust between the buyers and suppliers and led to making the surveys common throughout the purchasing field (Nelson et al., 2001). It is difficult to measure the impact of supplier perception, but in order to create better supplier relationships, organizations must be able to measure them. Leading-edge indicators, such as the SPS, are widely used in the private sector by purchasing professionals, but are not often used in the public sector (V. Pontani, personal communication, July 29, 2011). The VA's SPS is administered biannually, and the initial survey conducted this year allowed the VA to create a baseline against which it can measure progress resulting from its efforts to create better relationships with its suppliers.

Discussions on the importance of supplier relationships are increasing in purchasing literature (Monczka, Choi, Kim, & McDowell, 2011; Sandor, 2010). The key components of supplier relationships include trust and commitment, which are central to relationship marketing theory (Morgan & Hunt, 1994). When there is a high level of trust and commitment in the relationship with the supplier, the occurrence of opportunistic behavior decreases and leads to lower transaction costs resulting from reduced supplier monitoring, as shown by TCE (Williamson, 1985).

The VA was able to avoid the many bureaucratic issues that often plague government projects, saving both time and money, by working with MSU indirectly through a teaming arrangement in which the Ambit Group, a small business, is the prime contractor (V. Pontani, personal communication, July 29, 2011). This public-private-academic partnership is a great example of a partnership with the highest rated university identified during our social network analysis (as shown in Table 12). The VA's work with MSU is a comprehensive customer satisfaction initiative that includes internal acquisition customer satisfaction surveys, the supplier perception survey, forums, webinars, a focused website, and other services (V. Pontani, personal communication, July 29, 2011).

The results of the VA's SPS indicated that it has earned trust from its suppliers and is positioned to use its credibility to drive more strategic supply chain



management initiatives around cost elimination, innovation, and continuous improvement (Ambit Group, 2011). Although cost is an important factor to monitor, equally important to monitor is the quality of products or services (Sandor, 2010). If a company can improve its supplier relations to the point that the supplier can gauge the company's needs before it knows what they are, then the organization is able to get more value as well as lower costs. Social exchange theory supports this assertion. Social exchange theory indicates that the actions firms undertake are in response to an anticipated reward or benefit (Homans, 1958). If suppliers view the VA's efforts to understand its needs and wants as an investment in the buyer–supplier relationship, then the suppliers will be more inclined to act favorably toward the VA. This value creation results in a stronger buyer–supplier relationship, which leads to reduced procurement costs for the VA in the long run (Cannon & Homburg, 2001).

The remaining three activities that we discussed in this section are recommendations from the report arising from the teaming relationship with MSU, which most significantly recommended more education for the VA's contracting personnel in order to achieve the goals of reducing costs through better supplier relationships (Ambit Group, 2011). While supplier relationship management initiatives are not currently implemented across a wide spectrum of federal agencies, there are no regulations prohibiting their creation (Thai, 2009). The GAO indicated that it is possible for agencies to develop effective supplier relationships within the realm of the Federal Acquisition Regulations by establishing effective supplier relationship management as a core business strategy, employing rigorous supplier selection to create a strong supplier base, establishing commodity managers to more effectively manage key goods and services, and establishing and maintaining an effective communication and feedback system with suppliers. (GAO, 2005, p.18)

(2) MSU Executive Education. For the second activity, the VA is sending supply chain leaders from throughout the organization to several executive education seminars in purchasing, logistics, and procurement at MSU. Senior





members in the procurement field from many top commercial companies routinely attend these seminars (V. Pontani, personal communication, July 29, 2011). These seminars also serve as an important resource builder for the VA. A core tenet of resource-based view theory is that the basis of a firm's competitive advantage is found through the use of the valuable, or strategic, resources that the firm controls (Rumelt, 1984; Wernerfelt, 1984). One resource that is of importance to the VA in this regard is its human capital. By sending its procurement executives to this seminar, the VA is indicating that it wants to ensure that its resources are educated. This education leads to the development of capabilities that the VA can exploit to ensure that the procurement side of the agency can operate at a sustained competitive advantage. For the VA, this sustained competitive advantage allows the organization to achieve the cost savings, value creation, and stronger buyer–supplier relationships that it desires to achieve its procurement goals.

Supplementing the educational benefits associated with these seminars are the networking opportunities that occur, as well as exposure to other industry best practices. This is a great example of many of the aspects of social network theory, a key tenet of which states that when organizations cooperate and share knowledge, greater value is created for all the actors (Inkpen & Tsang, 2005). The highlight of the seminars for the VA's senior procurement leaders is the sharing of best practices with their peers (V. Pontani, personal communication, July 29, 2011). They have developed relationships with Lockheed Martin and Whirlpool procurement executives, allowing them to visit their organizations and learn from their best practices (V. Pontani, personal communication, July 29, 2011).

(3) Industry Advisory Group. Another great example of the partnership between MSU and the VA is the VA's participation in MSU's industry advisory group, which includes members from a diverse range of companies. This is a self-regulating and self-guiding group that was created to get private industry's input to improve the VA's procurement practices (V. Pontani, personal communication, July 29, 2011). The group is run by MSU, which runs industry advisory councils for companies such



as GM, Harley Davidson, John Deere, and Hewlett-Packard. The group meets quarterly and includes members from 24 companies (V. Pontani, personal communication, July 29, 2011). The Air Force engaged in a similar industry advisory group effort during the 2001-2003 time period (Reese & Pohlman, 2005). Unfortunately, the engagement was not a long-term initiative and was disbanded after several years. While the VA's efforts to engage with MSU is not the federal government's first attempt at implementing an advisory group, it is important that federal agencies are taking steps to readdress an important practice.

The advisory group is another significant example of the benefits of social network theory and organizational learning. Similar to what we discussed under the MSU Executive Education section, social network theory indicates that the cooperation between the VA and members of industry will result in significant value creation for all of the actors. At the same time, organizational learning theory suggests that the VA's continuous interaction with industry will greatly increase the scale and depth of procurement knowledge that the organization possesses as a whole. According to Carter (2005), this transfer of corporate procurement knowledge (i.e., best practices) will result in improved supplier performance and reduced costs for the VA.

(4) Executive Advisory Board. The final activity is the Executive Advisory Board for MSU. As a condition of its partnership with the VA, MSU asked the VA to join the board. The board is a joint academia-industry focus group that examines broad trends in supply chain management. The board also advises MSU on the development of future supply chain professionals by focusing the direction for the MSU's executive education programs (V. Pontani, personal communication, July 29, 2011). This best practice is a fundamental example of resource dependence theory. The primary assumption of resource dependence theory is that organizations are composed of both internal and external coalitions (Pfeffer & Salancik, 1978) and that these coalitions "emerge from social exchanges that are formed to influence and control behavior" (Ulrich & Barney, 1984, p. 472). The social exchange that occurs



during the advisory board meetings is a fundamental example of internal coalitions (VA procurement executives) engaging with external coalitions (members of industry/academia). This is another great example of the continuous education of contracting professionals being used to support the improvement of supplier relationships.

#### **b. Application to Federal Government Sourcing**

Because improving relationships with suppliers has been shown to lower an organization's total operating costs (Sandor, 2010), this best practice from procurement departments in the private industry should be adopted by federal procurement agencies. The VA is the only federal agency that has fully adopted this best practice (V. Pontani, personal communication, July 29, 2011), and it is leading the way in improving relationships with its suppliers through the use of its SPS (Ambit Group, 2011). The VA's focus on improving its relationships with suppliers is only half of its success story. The other half is the VA's dedication to enhancing the education of its procurement professionals. Through the VA's executive education program and through its participation in advisory groups at MSU, it has provided its senior procurement professionals with an important education in procurement. The VA's partnership with MSU has given it great opportunities to network and gain exposure to other industry best practices.

The VA's partnership with MSU is a best practice from the VA's procurement department that should be adopted by the federal government as a whole. If adopted, it would provide procurement professionals across all federal agencies with the educational benefits and networking opportunities they need to achieve reduced costs and improved quality through better buyer–supplier relationships.

#### **2. Department of Energy Innovative Construction Contracting Methods**

The Department of Energy's (DoE's) National Renewable Energy Laboratory (NREL) in Golden, Colorado, encountered a potentially serious acquisition problem





in the spring of 2008. The NREL needed to construct a research support facility that was capable of supporting approximately 800 staff members and their ongoing research projects; however, it faced both a significant time and budget crunch (Baker & Haselden, 2011). Congress appropriated approximately \$65 million for the construction and furnishing of the research support facility and indicated that no additional money would be made available in the event of a cost overrun; Congress also stipulated that the construction had to be completed no later than two years after the DoE received the funding. Facing these time and fiscal constraints, the DoE realized that the traditional construction contracting methodology would not be effective in its situation. Compounding the time and money constraints was the goal to construct a building that would “redefine commercial building energy performance in support of national goals” (Baker & Haselden, 2011, p. 15).

To achieve this energy efficiency goal in light of the funding and time constraints, the DoE realized that the traditional risk-sharing methods that construction contracts employed would not meet its needs within its timeframe and budget. The design, bid, build corporate standard that most construction contracts employ means the buildings are treated as mere commodities that shift the risks associated with the build instead of mitigating them (Baker & Haselden, 2011).

Realizing that the private sector offered experience and tools to develop the requirement, the integrated project team brought in “third party experts to assist in performance objective and substantiation criteria development” (Baker & Haselden, 2011, p. 17). The involvement of a third party in the development of the request for proposal was an important factor in mitigating any potential principal–agent problems that might develop later in the acquisition process. By involving the “agent” (used in this instance as a general reference to represent an interested party that is not a government employee) in the requirements development allowed for the development of a proposal that resulted in a mitigation of risk that would otherwise have been shifted to the agent, which would then have resulted in a significantly more expensive proposal due to the additional risk. This first level of the DoE’s



acquisition strategy was essentially a “mini competition” that resulted in three finalists submitting what amounted to draft designs for the construction of the building. Understanding that there would only be one winner from this competition, the DoE established that the two finalists that were not selected would receive \$200,000 to cover their proposal submission costs.

The payment served as an important incentive for both the offerors and the DoE. By covering some, if not all, of the proposal costs, the DoE was demonstrating that it valued the unsuccessful contractors’ submissions and was rewarding them for their best efforts in the hopes that the contractor would be more likely to bid again in the future. This prevented an erosion of an important supplier base and ensured that adequate competition will exist in the future, potentially resulting in lower acquisition costs for the DoE. With the finalized Request for Proposal (RFP) in hand, the DoE unveiled its final acquisition strategy. To construct the building, the DoE utilized a performance-based, phased, firm-fixed price design-build with incentives contract (Baker & Haselden, 2011, p. 19).

To achieve the performance-based aspect of its strategy, and to ensure that its environmental goals were addressed, the DoE utilized 25 criteria. The criteria were broken down into three categories: mission-critical, highly-desirable, and if-possible. This meant that any of the offerors would have to address the mission-critical criteria to be considered responsive, and the inclusion of any plans to address the other two categories would be taken into account during the best-value selection process. Jeff Baker, Director of the Office of Laboratory Operations, essentially described this as a way to incentivize the contractor to see “how many of the performance objectives [the contractors] can achieve” (Baker & Haselden, 2011, p. 20). This also significantly reduced the transaction costs for each offeror as well. The offerors were bidding based on a design of their own creation. This meant that there were no “bridging documents” to impede their design creativity because they were essentially starting with a clean slate, thus lessening the cost for an offeror to compete.



The next step in the acquisition process was the “phased” approach. The first phase involved the preliminary design, and the second contained the finalized design and construction components. An important aspect of the first phase was the use of an off-ramp. The off-ramp was structured to encourage the exercise of an option; however, it did offer an *out* for either the government or the contractor in the event that either was uncomfortable with the level of risk the preliminary design presented (Baker & Haselden, 2011). However, because the integrated product team conducted extensive risk mitigation efforts early in the acquisition process, the off-ramp was not necessary and the contractor proceeded into the second phase of the contract. The off-ramp served an important purpose in that it reduced the ultimate risks to both the contractor and the government; if utilized, it would have been costly to both the government and the contractor. This represents another important aspect of agency theory, the importance of which was highlighted by one of the group panel speakers at the NCMA World Congress. Terry Raney, Senior Vice President of CACI International’s Business Management Division, stated that “simply shifting risk does not mitigate risk” (T. Raney, personal communication, July 11, 2011). By starting risk mitigation efforts early in the acquisition process, and by utilizing a phased approach to allow for a sharing of the remaining risk evenly between the contractor and the government, the DoE prevented a number of principal–agent problems that would have disrupted operations had they occurred.

The firm-fixed price design-build with incentives contract type represented a significant portion of the performance-based motivation. The DoE engaged in a target value design that allowed it to group its dollars into prioritized areas, such as energy efficiency (Baker & Haselden, 2011, p. 25). To counterbalance the fixed-price requirement and to drive innovation, the DoE included an award fee as well that provided “incentives to induce continuous attention by contractor management” (Baker & Haselden, 2011, p. 26). The contractor representative, Byron Haselden, who spoke during the presentation at the NCMA World Congress, offered a simple explanation that the inclusion of an award fee induced the construction team to drive



for superior performance for the simple reason that “money talks and people listen” (Baker & Haselden, 2011, p. 27).

The unique acquisition strategy employed by the DoE “created value beyond the budget at lower cost and risk to all parties” (Baker & Haselden, 2011, p. 28). Throughout the life of the contract, no claims were filed, and DoE contracting personnel had “virtually no contingency use for unknowns or omissions” and were able to take occupancy of the building less than 16 months after construction began (Baker & Haselden, 2011, p. 28). Utilizing this unique strategy, the DoE was able to fulfill its goals for energy efficiency, take possession of its building ahead of schedule and under budget, and lay the framework for others to duplicate its success (which the DoE itself was able to do under five other contracts with three different contractors).

#### **a. Application to Federal Government Sourcing**

The DoE’s acquisition planning best practice is of particular importance to federal procurement, and especially to the DoD given the large number of dollars associated with military construction (MILCON) appropriations. As an example, the Air Force has an FY2011 MILCON budget of over \$1.9 billion (United States Air Force [USAF], 2010), and the DoD is projected to spend more than \$18.7 billion on MILCON during FY2011 (United States Senate Committee on Appropriations, 2010). By adopting the strategy that the DoE developed and refined through its building construction efforts, the DoD can potentially save millions of dollars that can be put to use on other programs. The bigger picture aspect of adopting this construction contracting strategy will be the improved utilization of agency theory and TCE tenets by federal procurement professionals. By providing stronger incentives to the contractor (the agent) to both propose innovative solutions and to engage in cost-saving behavior, contracting officers (the principal) are better enabled to meet the needs of the customer in a fiscally constrained environment. Also, the contractor’s motivation should result in lower transaction costs. The reduction stems from a reduced contract oversight requirement, and also gives the contracting officer



greater discretion to write contracts that are not “airtight” (further reducing the costs incurred as well). A better understanding of these ideas will result in better contract and negotiation efforts in not only the construction arena but also in other aspects of contracting that federal procurement officials engage in. While it is difficult to estimate how much will be saved in the other areas, it is not difficult to postulate that the relations between the government and contractors will improve markedly as a result.

### **3. Open Communication to Mitigate Risk**

While the previous best practice example discussed mitigating risk, the measures taken in that example were not an exhaustive list of what the private and public sectors use. Over the course of two days, a series of general session panels took place at the 2011 NCMA World Congress in Denver, Colorado. These panels were chaired by senior leaders in the procurement field in both the private and public sectors. While a number of different topics were broached, a recurring theme was the idea of risk mitigation. In particular, four panel members offered a series of recommendations (and some observations) that identified where government procurement is failing when it comes to mitigating risk and how open communication in the private sector can be utilized to improve relations between both parties. In particular, the panel members drew heavily from the ideas behind relationship marketing and agency theory.

The representatives from industry identified some important examples in which they performed contractual agreements with other private-sector companies that were of a similar risk profile. During these arrangements, they were able to successfully share the risk, or at least utilize the proper incentives so that the risk level was commensurate with the reward.

The four panel members who spoke, and who are quoted from in this section, are as follows:



- Terry Raney, Senior Vice President and Division Group Manager, Business Management Division, CACI International, Inc.;
- Steven L. Schooner, Associate Professor of Law and Co-Director of the Government Procurement Law Program, George Washington University Law School;
- Steve Kelman, Weatherhead Professor of Public Management, Harvard Kennedy School; and
- Brigadier General Frank J. Anderson (Ret.), Former President of Defense Acquisition University, President of Strategic Public Sector Solutions, LLC.

Based on our analysis of the opinions offered by these four panel members, it appears that the government's lack of ability to mitigate risk is mainly a communication problem rooted in agency theory and TCE; however it appears that the "solution" to this problem can be found through the application of relationship marketing.

The root of the problem starts with the defense industry's perception that the only way the government can handle risk is by shifting all or most of it back onto the contractor. However, "simply shifting risk does not mitigate risk" (T. Raney, personal communication, July 11, 2011). This is a fundamental example of the principal-agent problem, as described in agency theory. Here, the government (the principal) cannot develop a plan to handle the risk, thus, it simply shifts the risk to the contractor (the agent). As a result, the government may incur a higher cost for the service than if it had developed a risk mitigation plan, and "by the government deferring all the risk to the contractor it actually increases the total risk of an acquisition because the government is no longer taking action to mitigate the risk from their standpoint" (T. Raney, personal communication, July 11, 2011).

Further complicating the risk mitigation and shifting efforts is the defense sector's perception of a serious communication problem between the government and industry. Steven Schooner (personal communication, July 11, 2011) commented that "the art of communicating requirements ... is going to be a huge challenge in the





future.” Essentially, if the government cannot describe what it wants, how can it expect the contractor to perform successfully? It would seem that the government is currently living in the future. This lack of communication is rooted in a segment of TCE. It appears that the government is afraid of making itself vulnerable to the contractor by communicating the fears (or risks) that it has regarding an acquisition. Essentially, the government is concerned that the contractor may demonstrate some opportunistic behaviors and take advantage of the government’s perceived weakness, potentially causing the contractor to hold up the government. Whether that belief is reality is a highly subjective idea, but essentially the situation boils down to a quote from the movie *Cool Hand Luke*: “What we’ve got here ... is ... failure to communicate” (Carroll, 1967).

An example of this failure to communicate was presented by Steve Kelman (personal communication, July 11, 2011), who commented on the status of open communication between government and contracting officials by stating, “I was saddened that ... we have to ask the question ‘can we talk?’” Terry Raney (personal communication, July 11, 2011) went on to describe a symptom of this communication problem that affects both government and private industry contracting professionals, explaining that “with the government’s loss of pricing function they [the government] have stopped trusting contractors because they have lost the ability to verify.” Further evidence of this breakdown in communication is the government’s retraction from the use of alpha contracting (Hawkins & Cuskey, 2011). This is an unfortunate demise, as alpha contracting “is a collaborative effort between a buyer and supplier during contract formation to maximize efficiency and effectiveness” and its use “compressed procurement lead time and at reduced costs” (Hawkins & Cuskey, 2011, p. 241).

To address the communication concern that is at the root of the risk management problem, Frank Anderson (personal communication, July 11, 2011) offered a series of solutions and advice that tie back into the roots of relationship marketing. Utilizing his experience as a long-time public procurement professional



and his more recent experience in industry endeavors, Anderson surmised that for the communication problem, and through that the risk management concern, the public and private sector need to “create an open environment where people can exchange ideas, and that it won’t be used against them.” This open environment is the first step in allowing the formation of a successful, long-term relational exchange between government and private-sector procurement professionals. In their seminal 1994 article, Morgan and Hunt stated that “successful relationship marketing requires relationship commitment and trust” (p. 20). Frank Anderson (personal communication, July 11, 2011) touched on this same point by stating and answering his own question: “How do you build trust? It starts with open communication.” For the government to move forward and improve its communication with industry—and through that its risk mitigation efforts—it must focus on trust, relationship, and openness, all of which are fundamentals of a successful relational exchange (F. Anderson, personal communication, July 11, 2011).

**a. Application to Federal Government Sourcing**

The implications for opening lines of communication, and in turn increasing trust, for federal procurement risk mitigation efforts are significant. Specifically, the federal government engages in a significant number of contract actions that are inherently risky. By developing an understanding of the tenets of agency theory and TCE, the procurement workforce will be more adept at identifying underlying communication problems with contractors. Additionally, through an application of the relationship marketing tenets, the procurement workforce can be educated to seek out ways to improve the communication and risk mitigation problems that were previously identified during the course of our research. This essentially boils down to the requirement that the federal government must first build an open and trusting relationship before the problems associated with risk can be addressed with greater ease.





#### **4. Procurement Knowledge Management**

Reports indicate that most federal agencies do not have the processes and databases in place to successfully share information within their own agencies, which is in stark contrast to their private sector counterparts (GAO, 2006; Husted & Reinecke, 2009). As a result, how can the public expect federal procurement professionals to share strategic sourcing lessons learned—or any acquisition strategies that were successful—across the acquisition workforce? Similarly, the federal government does not have a comprehensive repository of complete contracts since Electronic Document Access does not provide attachments. This lack of an easily accessible (and updatable) data repository results in a significant loss and duplication of organizational learning for public-sector procurement professionals.

According to Daft and Weick (1984), the way an organization learns and stores knowledge is important because organizations must take information from their external environment and then filter and process the information to survive. In order to be successful once an organization has obtained information, it must develop mechanisms that can process the information and detect “trends, events, competitors, markets, and technological developments” (Daft & Weick, 1984, p. 287). Because federal procurement agencies lack this essential tool, they are at a significant disadvantage to their suppliers. The private sector has successfully navigated this divide and established knowledge management systems that allow access to this essential information, thus preserving their organizational learning and reducing redundant actions as a result.

The last presentation that we attended at the NCMA World Congress demonstrated how off-the-shelf knowledge management tools could be easily tweaked to support the needs of federal procurement agencies. The software is known as the Tailored Acquisition Portal. More important, Tailored Acquisition Portal’s underlying software uses the Microsoft SharePoint platform, which is already widely distributed and utilized by federal agencies.



Tailored Acquisition Portal addresses the significant challenges that have derailed organizational learning endeavors. Although the federal government has implemented various other procurement knowledge databases in the past, these efforts have often been fragmented and not well known to the acquisition community. These efforts include the Defense Acquisition University's Ask a Professor, Air Force Knowledge Now, and various other communities of practice. What prevented these other databases from taking hold and providing the essential knowledge management tool that organizational learning requires is the inflexible nature of the databases (Hephner, 2011). These databases could not be edited or revised with any great ease, often requiring a system administrator's approval to change or add any information (Hephner, 2011). As a result, acquisition personnel failed to heavily adopt and use the other databases, which organizational learning literature attributes to the failure of the federal government to create learning systems that influence its members (Fiol & Lyles, 1985).

To ensure that the Tailored Acquisition Portal does not meet the same fate as the knowledge management system it is replacing, the Tailored Acquisition Portal utilizes the concept of distributed learning and crowdsourcing (Hephner, 2011). A foundation of social network theory, distributed learning indicates that when the system and processes are in place, unencumbered by bureaucracy, the workforce will improve its knowledge, its process, and the agency (Choa, Gay, Davidson, & Ingraffea, 2007). This allows agency members to update information, post new regulations, and perform other actions to ensure that the content stays relevant and accurate.

#### **a. Application to Federal Government Sourcing**

If the federal government can fix the main problem that knowledge management software presents (which is maintaining it on a consistent basis) through distributed learning and crowdsourcing, then the federal government will reap several important benefits. The first benefit is that, as a result of a functional organizational learning system, the amount of time spent searching for the latest and



greatest information will be significantly reduced. This ease of access means that the time to turn around each contract action is shortened and the customer's mission is fulfilled faster. The second major benefit is that the most current acquisition regulations are always being implemented in each contract action. This access to the most up-to-date information means that fewer administrative modifications will be necessary due to out-of-date (or flat-out wrong) information finding its way into the contract file.

The federal government has a huge knowledge retention problem, and this problem is exacerbated because we have so much churn with military members (both frequent relocations and deployments) and our civilian workforce is tired of training. By establishing an organizational learning system that retains the history and norms of the purchasing agency, the turnover of personnel will have a significantly reduced impact on knowledge loss and acquisition lead-time (Hawkins, Hildebrandt, & Muir, 2011). It is important to note that an effective knowledge management system not only “provides a vehicle to share information, but also builds a community of learners” (Rosenberg, 2001, p. 215). Pan and Scarbrough (1999) highlighted this fact in their case study of KM systems at Buckman Laboratories. Specifically, Buckman Laboratories successfully implemented a KM system that encompassed “customer knowledge, competitive intelligence, process knowledge, and product knowledge” (Pan & Scarbrough, 1999, p. 365). This is an important example as federal procurement agencies utilize information of a similar nature. Unfortunately, not all KM implementations fare as well. Research indicates that “a disturbingly high proportion of programs initiated with great fanfare are cut back within two or three years” (Lucier & Torsiliera, 1997, p. 15). This failure should be a warning sign to federal procurement officials, especially when operating in a fiscally constrained environment where future funding cannot be guaranteed.

## **5. Buyer–Seller Game Model for Bid Selection and Evaluation**

As a result of the highly decentralized nature of federal procurement, government watchdog groups have noted a large variation in how federal agencies



conduct source selections and evaluate offers (GAO, 2001). This lack of standardization and failure to follow proper source selection procedures has resulted in significant damages to the government. A high-profile example of this failure occurred in July 2008 with the Air Force's improper selection of Northrop Grumman over Boeing for the KC-X aerial refueling tanker competition. In its protest, Boeing challenged "the Air Force's technical and cost evaluations, conduct of discussions, and source selection decision" (GAO, 2008a, p. 1). With respect to the Air Force's source selection decision that chose Northrop Grumman over Boeing, the GAO (2008a) concluded "that the Air Force had made a number of significant errors that could have affected the outcome of what was a close competition between Boeing and Northrop Grumman" (p. 1). Specifically, the GAO (2008a) noted that the errors

included not assessing the relative merits of the proposals in accordance with the evaluation rules and criteria identified in the solicitation, not having documentation to support certain aspects of the evaluation, conducting unequal and misleading discussions with Boeing, and having errors or unsupported conclusions in the cost evaluation. (p. 1)

These errors noted by the GAO were significant enough that the Air Force terminated the contract with Northrop Grumman and a new competition was held. Unfortunately, the source selection errors in the KC-X tanker competition are not examples of an isolated occurrence within federal procurement. Errors of this nature have cost the government significant sums due to protests, re-competitions, and termination costs.

To their credit, procurement professionals in the private sector have developed solutions to address the vendor/bid evaluation and selection problem. Professionals in the private sector realized that the "selection and negotiation of vendor bids is a critical decision faced by purchasing managers" (Talluri, 2002, p. 171). In fact, the source selection process faced by industry is relatively similar to what federal procurement officials face in that they both evaluate "several important bid attributes such as price, delivery performance, and quality" (Talluri, 2002, p. 171). This idea is supported by Burton (1988), who emphasized the importance of



evaluating the relative strengths of suppliers because they play a large role in determining the final cost and quality of the product.

While some industry source selection models focus on achieving cost savings in every transaction, it is not appropriate for every transaction. Wise and Morrison (2000) demonstrated in their research that the emphasis on transaction costs causes buyers to lose sight of other equally important factors such as quality, delivery, and customization. Although both the federal government and industry engage in a number of commodity-type procurements in which this strategy might be effective, it is not an ideal solution. In fact, this overreliance on cost savings has “placed tremendous pressure on the highest-quality and most innovative suppliers” (Wise & Morrison, 2000, p. 92) and forced some out of the marketplace.

To ensure that an adequate supply base is maintained and that the complex needs of the buyer are met, industry realized a new solution was required. Industry realized that it was important to build a model “that can be applied for evaluating vendor bids in the presence of multiple attributes” (Talluri, 2002, p. 172). This has important implications for federal procurement because source selections are not always based on the lowest-priced offer; often there are other more complex factors (past performance, schedule, technical acceptability, etc.) to consider as well.

Models have been developed that predict and reproduce supplier behavior based on past performance and other inputs in order to assist in the source selection process (Talluri, 2002). Feng, Fan, and Li give credit to Srinivas Talluri for developing one of the more prominent and successful game theory models in the field of economics (2011). Talluri (2002) developed an advanced model that utilizes the tenets of game theory to propose “a set of game models that evaluate vendor bids based on ideal targets set by the buyer” (p. 172). Specifically, Talluri (2002) utilized a subset of game theory, exploiting the complex nature of multi-player games so that his models



are structured in such a way that there is limited scope for a bid, which excels on relatively fewer measures, to be identified as a good performer. The game model results are utilized in a 0–1 integer programming model in selecting an optimal set of bids that satisfy the demand requirements of the buyer, and the minimum order necessities of the vendors. Effective negotiation strategies are then proposed for unselected bids in making them competitive. (p. 174)

#### **a. Application to Federal Government Sourcing**

Talluri's (2002) innovative use of multi-player game theory created a paradigm shift for the private sector when it came to evaluating suppliers beyond price-only factors. While the private sector is not constrained by the trappings of the Federal Acquisition Regulation, the environment in which they operate is very similar to that which federal procurement officials face. The constraints of the Federal Acquisition Regulation may inhibit a pure adaptation of this model, but it is important that federal agencies work to apply the multi-player game theory elements behind Talluri's model to their sourcing practices. His model would allow the federal government to utilize some of the important tenets of game theory in order to standardize its source selections of complex items. Through this standardization, federal procurement officials could reduce the likelihood of source selection mistakes and could reduce acquisition costs as a result. Specifically, Apte, Rendon and Salmeron (in press) developed a source selection optimization model, using the Air Force's strategic sourcing process as their anchor, and demonstrated "improvements over the current sourcing process in both overall performance and cost" (Apte et al., in press, p. 1). Optimization programs such as LINDO Systems' optimization software offer an easy way to create customized optimization solutions necessary to reduce both acquisition cost and mistakes (Schrage, 1984).

### **6. Contingency Theory in Purchasing Organizational Design**

Research in contingency theory, as it pertains to the purchasing realm, offers some important insights as to how the structure of a purchasing organization can contribute to its success. Specifically, research has shown that in order to remain competitive (or to maximize performance) companies must adapt their organizational





structure and management practices in response to changes in the competitive environment (Galunic & Eisenhardt, 1994).

Although it is important that an agency be able to adapt to a changing environment, contingency theory supports that there is no single, ideal organizational structure for purchasing (Leenders & Johnson, 2000). Research has shown that firms make continual changes to their organizational structure in an effort to lower their total operating costs (Leenders & Johnson, 2000). These frequent changes to the organizational structure of purchasing are a direct result of a firm's senior management adjusting corporate strategy to address changes in the competitive environment (Leenders & Johnson, 2000). In particular, the person or persons to whom the senior procurement official reports "plays a vital role in breaking down corporate roadblocks, setting priorities and ensuring the proper profile for supply within the organization" (Johnson & Leenders, 2006, p. 334).

Contingency theory clearly identifies that a strong gap exists between industry and federal government practices. The federal government is extremely slow to react to changes in the competitive environment, especially when it comes to purchasing-related efforts. A significant example of this gap is the adoption of e-procurement practices. Although industry has taken a contingency approach and successfully adopted such practices as electronic data interchange (EDI), automated spend analysis, electronic proposal evaluation, electronic reverse auctions, central contract repositories, supplier performance management, automated purchase-to-pay processes, and other business-to-business e-procurement measures as the changing competitive environment demanded, the federal government has failed to do likewise. While industry was adopting these new and incredibly useful tools, the federal procurement agencies lagged behind, often adopting the tools years after they became an industry standard. Compounding this is the federal government's piecemeal and haphazard approach to adoption. For example, while federal procurement agencies adopted an EDI-like tool known as FACNet in the mid-1990s,



federal government agencies lacked automated proposal submission and evaluation systems.

A further complication to adoption efforts of FACNet is that change is slow to occur within federal procurement, which is due in strong part to the bureaucratic nature of federal agencies. As a result, it is difficult for a centralized head purchasing official for the federal government to take action to effect change. The federal government does not have a single, empowered head purchasing official that takes on the accountability and role like a chief procurement officer (CPO) does for major corporations in the private sector. Recent research (Falcone, 2010) highlights this inadequacy. Falcone (2010) indicated that the Air Force's attempt at creating "chief acquisition officers" failed because Deputy Assistant Secretary for Contracting (SAF/AQC) cannot be a CPO in that it lacks operational authority over all Air Force procurement, which is retained by the Major Commands (MAJCOMs) respectively.

Contingency theory, however, offers a solution to this adoption problem. Johnson and Leenders (2006) conducted survey research in a series of eight-year intervals that included 1987, 1995, and 2003 that examined "the high level of change in supply organizations of large North American companies" (p. 332). In particular, their survey focused "on purchasing's organizational roles and responsibilities" (Johnson & Leenders, 2006, p. 335), and the survey questions themselves dealt with "organizational size, CPO titles and background, reporting line and supply organizational structure" (p. 335).

The results from their three surveys were used by researchers to determine how often these large companies shifted their procurement organizational structure in response to their environment and to what type they shifted. The results from Johnson and Leenders (2006) represented a fundamental application of contingency theory in that it did not seek to determine the "perfect" organizational structure, but rather sought to evaluate how adaptable the companies were. Johnson and Leenders' (2006) survey sample is an impeccable comparison to the size and scope on which federal procurement agencies operate. In particular, Johnson and





Leenders (2006) identified that the “respondents in this research are among the largest firms in North America. Consequently, the challenges associated with implementing a major organizational structure change represent a significant undertaking and managing organizational change represents an important issue facing CPOs” (Johnson & Leenders, 2006, p. 336).

Their survey results clearly showed that most firms significantly adjusted their purchasing structure, with some firms making rather dramatic changes such as “one respondent moving from a centralized to decentralized structure and two respondents moving from decentralized to centralized structure” (Johnson & Leenders, 2006, p. 336). As a whole, their survey noted that “26 of the 51 firms (51%) had a different organizational structure in 2003 compared to 1987, and 10 firms (20%) reported changing organizational structures between 1987 and 1995 and again between 1995 and 2003” (Johnson & Leenders, 2006, p. 336). Researchers have attributed industry’s sudden shift in its organizational structure in the mid- to late-90s to an increase in outsourcing (Laios & Moschuris, 1999). Additionally, industry came to the realization that a competitive advantage is gained by making purchasing more strategic (i.e., either center-led or centralized; Keough, 1993; Rozemeijer, van Weele, & Weggeman, 2003). Apparently, the federal government has not acknowledged the strategic importance of purchasing because it remains mostly decentralized, with only loose attempts to superimpose a voluntary center-led constructs at the top-level.

#### **a. Application to Federal Government Sourcing**

If large enterprises in the private sector are undertaking such radical procurement shifts to adapt and survive, what does that say about the federal government’s ability to adapt and utilize a contingency model? What matters is that the government can utilize a contingency outlook to run its procurement operations so that it can adapt and survive. Although which type of procurement model (centralized, hybrid, or decentralized) that the government adapts does not matter according to contingency theory, research has shown that the most successful



model in the field of purchasing is the centralized model in the form of center-led procurement (Limberakis, 2011).

By utilizing a contingency approach to adaptation, the federal government can significantly streamline its acquisition operations by migrating to a center-led organizational structure. This adaptation would result in a significant reduction in acquisition lead-time. Additionally, federal agencies would achieve cost savings through a reduction of labor costs and being better able to interface with the changing face of industry.

## E. Summary

In this chapter we outlined the research we completed in order to understand the realm of purchasing knowledge and to identify both theoretical and practical insights that will be useful to the progression of federal procurement. From our analyzes we were able to accomplish the following: (1) determine the extent to which research in the purchasing field relies on theory, (2) explore the patterns and insights from knowledge producers and knowledge repositories by using social network analysis, and (3) combine a theoretical analysis with a social network analysis and identify six best practices that can be used in federal procurement. In Chapter V, we provide our conclusions for this study, including a summary of our analysis, a discussion of the study's limitations, and recommendations for future research.



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## V. Conclusion

### A. Introduction

Federal procurement is responsible for acquiring goods and services worth billions of dollars each year, yet the GAO continually identifies systemic weaknesses in the means that the federal government accomplishes this task (GAO, 2005). Combining today's budget constraints caused by the weak economy (Congressional Research Service, 2011) with the systemic weaknesses pointed out by the GAO makes it clear that there is a need for more efficiency in federal procurement. Through an examination of existing research in the field of purchasing, the federal government can begin to address its lack of efficiency in federal procurement. In order for this research to be meaningful, it must be grounded in theory (Defee et al., 2010) and must integrate the ideas from theory into practice (Chandra & Kumar, 2000). By conducting gap-analysis on the federal government's sourcing efforts and on dominant purchasing-related theories, the government can identify potential areas for improvement to its practices. Also, by conducting a social network analysis on purchasing-related scholarly contributions, the government will be able to explore patterns and insights from the knowledge producers and repositories. After identification, the government can exploit that knowledge base to better leverage purchasing theories in federal purchasing practice.

### B. Answers to Research Objectives

To investigate the problems facing federal procurement, we conducted our research with the aim to achieve the following objectives:

- determine the extent to which theory is used in the purchasing field of research,
- uncover and summarize the prevalent theories found in the purchasing field of research,
- analyze the social network of purchasing knowledge production, and



- examine how purchasing theory can inform and improve federal government purchasing practices.

First, we identified that the use of theory in the purchasing field increased from the baseline (2002–2005) to the inquiry (2006–2009) periods, climbing from 45.9% to 51.2% of the purchasing articles. Next, using the theory-based purchasing articles identified during our examination, we uncovered and summarized the top theories in the purchasing field, which can be found in Chapter III. We then performed a social network analysis on the affiliations of the researchers who produced purchasing theory-based research and identified the top purchasing knowledge production centers, which can be found in Chapter IV in Table 12. Finally, using the top theories and institutions identified in the course of our research, we examined how purchasing theory can inform and improve federal government purchasing practices, which can be found in Section D of this chapter.

## C. Discussion and Implications

In this section we discuss the implications from our analysis in Chapter IV.

### 1. Article Analysis

Our content analysis of 2,338 articles in the top eight purchasing journals uncovered 725 articles (31% of the total article count) that we classified as purchasing-related articles based on 12 subtopic purchasing criteria. Out of the 725 articles we classified as purchasing articles, we classified 356 (49.1% of the purchasing article count) as being theory-based, with a total of 528 theoretical incidents recorded. From the sample of 356 articles that we identified as theory-based, we identified 123 unique theories. Of those 123 theories, we found that the top 10 most frequently used theories represented more than 50% of the total theoretical incidents. Because these theories represented the top 10 most widely used theories in the field of purchasing, supply chain management and logistics doctoral programs should cover these theories in their seminars. Table 13 lists the 10 most frequently used theories.



**Table 13. Top 10 Purchasing Theories**

1. Transaction Cost Economics (TCE)
2. Resource-Based View (RBV)
3. Social Exchange Theory
4. Relationship Marketing
5. Contingency Theory
6. Resource Dependence Theory
7. Agency Theory
8. Game Theory
9. Organizational Learning
10. Social Network Theory

After we made the purchasing determination, we then conducted a content analysis on the 725 purchasing-related articles to determine whether the article used theory. To determine whether the numerous calls for an increase in theory-based research in the field of purchasing over the last 10 years (Carter & Ellram, 2003) had been addressed, we established in our research a baseline period (2002–2005) to determine the level of theory-based research prior to the calls. After establishing the baseline, we employed the same review methodology to evaluate articles from 2006–2009, the inquiry period, to determine whether an increase in theory-based research had actually occurred.

Table 14 shows there was a 5.3% increase in theory use from the baseline period to the inquiry period. After performing a statistical analysis on the data, we were able to infer that the overall use of theory in purchasing research increased during the inquiry period when compared to the baseline period. Additionally, there was a statistically significant increase in the number of theoretical incidences per article from 1.18 to 1.26 from the baseline period to the inquiry period.



**Table 14. Average Percentage of Purchasing Articles Using Theory, Average Number of Theoretical Incidents per Article during the Baseline and Inquiry Periods and Statistical Support**

Period	% Theory Use	# of Theoretical Incidences per Article
Baseline (2002–2004)	45.9	1.18
Inquiry (2005–2009)	51.2	1.26
<i>p</i> value for one-tail test	$P(Z < z) = 0.0569$	$P(T < t) = 0.0497$

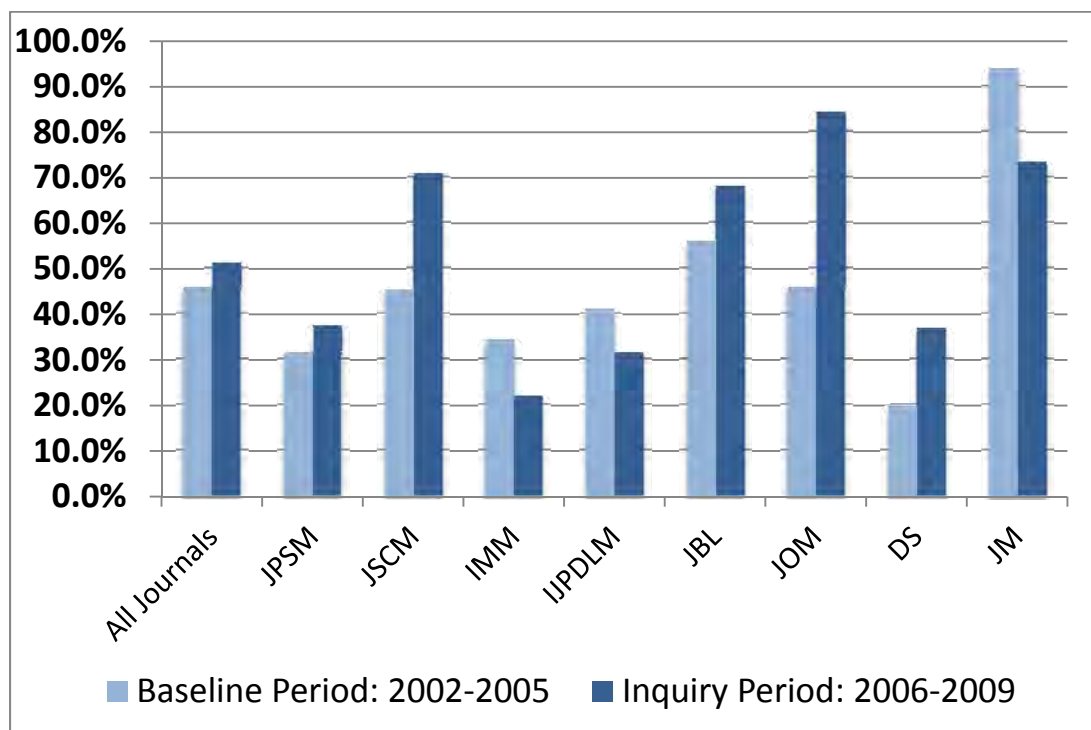
The implication of our finding of an increase in theory use is that the purchasing field is meeting the numerous calls for an increase in theory-based research over the last 10 years (Carter & Ellram, 2003). It is clear that research in the field of purchasing is becoming more rigorous due to this increase. Through this increased rigor, purchasing research findings enable more accurate and relevant implications that will, in turn, be better able to explain and predict phenomenon. A proliferation of exacting research in the purchasing field is important, as Harland et al. (2006) concluded that the field of supply chain management was not a discipline because it “lacks quality of theoretical development and discussion, and coherence” (p. 730). Specifically, Harland et al. (2006) indicated that the coherence of a field is determined through “the questions on which it focuses, how it tackles those questions, and how structured and organized it is in debating and resolving disputes” (p. 732). Coherence of a field is also established through an examination of the “unity and a common focus [found] in the publications” (Harland et al., 2006, p. 737). The theoretical development and discussion of the field represents an essential benchmark as to its maturity (Harland et al., 2006). Harland et al. argued that “quality of the discipline should be judged in part through examination of the sufficiency of theory development” (2006, p. 745). We conclude that this enhancement of purchasing research will help elevate the field of supply chain management to the status of a distinct academic discipline.

Our research shows that while the purchasing field is using more theory, there has been a decrease in the opportunity for publishing theory-based





purchasing-related articles, particularly in the United States. Figure 14 shows that the number of purchasing articles using theory for each journal changed from the baseline period to the inquiry period. Five of the journals (*JPSM*, *JSCM*, *JBL*, *JOM*, and *DS*) increased the percentage of theory-based articles they published while three journals (*IMM*, *IJPDLM*, and *JM*) decreased the percentage of theory-based articles they published. The decrease is the most noticeable in the *JSCM*, where in the last two years, the number of purchasing-related articles fell sharply (see Figure 5) presumably due to the journal shifting its focus to the broader field of supply chain management (Emerald Group, 2010), while holding constant the number of issues per year and articles per issue. The remaining journals that are increasing their proportion of theory-based articles (*JBL*, *JOM*, and *DS*) publish a low number of purchasing articles. Further, *JPSM* is primarily a European, international journal desiring research of an international flavor. Combined, this situation renders theory-based research conducted in the United States more difficult to publish.



**Figure 14. Percentage of Purchasing Articles Using Theory by Journal for Baseline and Inquiry Periods**



The implications from this finding are far reaching for the field of purchasing because the opportunity to publish rigorous, theory-based purchasing research is decreasing. Because of this decreasing opportunity, there may be room for a new journal that targets the purchasing function of logistics. Absent sufficient outlets for strictly purchasing-related research, scholars in the purchasing field may have to modify their research questions to span more logistics functions than just purchasing. While more broad and integrated research addressing *supply management* is important, the practice of purchasing may suffer if top journals in supply chain management discount purchasing-unique contributions to be too narrow for publication.

## **2. Social Network Analysis**

We conducted a social network analysis utilizing a subset of 725 articles from the 2,338 articles we reviewed. These 725 articles consisted of those we identified as being purchasing related, per the examination we conducted in Chapter III. We utilized this subset to ensure that the results we obtained from our analysis were germane to purchasing alone.

As mentioned in Chapter II, we constructed a 653 by 653 cell matrix to perform the social network analysis. The reason for the matrix's size was that it had to encompass all possible relationships. This meant that every university or institution listed for the authors of the articles we analyzed as either an employer or a source of education had to be included on both sides of the matrix to ensure that it was symmetrical. This matrix served as the template in which we populated several samples of the data to analyze the social network trends. For example, the baseline period sample encompassed all of the affiliation information for all purchasing articles from our data set during the period 2002–2005. We utilized the following samples:

- a baseline period (2002–2005),
- an inquiry period (2006–2009), and



- the full sample (2002–2009).

We visualized the resulting matrices using the UCINET 6 and NetDraw software packages. Due to the complex nature of the visualized matrix, as shown in Figure 16, visual identification of the most important institutions was not possible. To accomplish this, it was necessary to perform a series of social network analysis measurements that mathematically determined which institutions produced the most purchasing research (or educated the most researchers). These measurements included the centrality and betweenness scores.

The Freeman centrality measure was important to this research because it revealed the interaction of the institutions statistically and provided a list of the most influential institutions in descending order (Hanneman & Riddle, 2005). It contains two components that were of great importance to this research: in-degree and out-degree. For our purposes, a high in-degree indicated that the institution was an important source of purchasing education, whereas a high out-degree indicated that the institution was a significant source of published purchasing research.

The betweenness centrality measure allowed us to measure and determine which universities or institutions were the most involved in the network. Utilizing both of these measurements, we performed an analysis and determined the centrality and betweenness scores for each of the 653 universities and institutions that composed the data sets. To interpret these values, we created a weighted measurement system of the social network analysis centrality and betweenness data. This weighted measurement indicated that the significant portion (more than 50%) of the network was represented by nine different institutions, shown in Table 12, indicating that these nine institutions represented the most significant contributors to the body of purchasing knowledge.

However, one institution (University of Manchester) is a foreign university. The likelihood of a partnership between the federal government and a foreign research institution is unlikely given the high level of approvals required. As such, we



removed it from consideration for our research purposes, leaving just the eight domestic universities, as shown in Figure 13. We found eight institutions (Michigan State University, Ohio State University, Arizona State University, University of Tennessee, Pennsylvania State University, Indiana University, Texas A&M University, and Georgia State University) to be centers of purchasing excellence. As a result, they are the most likely candidates for the federal government to partner with to further the public sector's procurement knowledge and improve sourcing practices.

Officials responsible for hiring procurement professionals within federal agencies should adapt their hiring practices and resources to target these eight institutions with the highest in-degree. Hiring officials should target potential applicants who have obtained master's or bachelor's degrees in supply chain management (or related) programs from these institutions. The federal government may go so far as to pay for the education of their best and brightest members in return for a guarantee to remain employed at an agency for a certain amount of time. This will ensure that a steady flow of knowledge of the top theories and best practices will come from these institutions into the federal government.

### **3. Best Practices Analysis**

We examined best practices from both the public and private sectors that utilized the top theories and ideas coming out of the top purchasing institutions we uncovered during the course of our research. Specifically, during our interactions with purchasing professionals at the NCMA World Congress 2011 in Denver, Colorado, we encountered several best practices that demonstrate great potential to improve federal government procurement practices. We also found other best practices during our extensive literature review. The next section briefly summarizes the six best practices, which are discussed in greater detail in Chapter IV.



**a. VA Partnership with MSU**

The VA formed a partnership with MSU to improve its relationship with its suppliers and to gain the necessary knowledge and skill set to contract effectively with industry. There were three recommendations that came out of the supplier perception survey done by MSU that were implemented by the VA with very promising results. The first recommendation was for the VA to send its supply chain leaders from throughout the organization to several executive education seminars in purchasing, logistics, and procurement at MSU. The second recommendation was for the VA to partner with MSU to start an industry advisory group. This group was created to obtain private industry's input to improve the VA's procurement practices. The third recommendation was for the VA to join the Executive Advisory Board for MSU, which is a joint academia-industry focus group that examines broad trends in supply chain management. These best practices in continuing education for procurement professionals are rapidly transforming the VA's acquisition program and should be adopted by all federal government agencies.

**b. DoE Innovative Construction Contracting Methods**

The DoE encountered a potentially serious acquisition problem when constructing a new research support facility due to strict budget and time constraints required by Congress. They were forced to revise their acquisition strategy to counterbalance the fixed-price requirement and to drive innovation. The acquisition strategy revision resulted in an extremely efficient, integrated project team that created significant buy-in among all parties and reduced cost. Utilizing this unique strategy, which we detailed in Chapter IV, the DoE was able to fulfill its energy efficiency goals, take possession of its building ahead of schedule and under budget, and lay the framework for others to duplicate its success (which the DoE itself was able to do under five other contracts with three different contractors). The bigger picture aspect of adopting this construction contracting strategy will be the improved utilization of agency theory and TCE tenets by federal procurement professionals. By providing stronger incentives to the contractor (the agent) to both



propose innovative solutions and to engage in cost-saving behavior, contracting officers (the principal) are better enabled to meet the needs of the customer in a fiscally constrained environment. Also, the contractor's motivation should result in lower transaction costs. The reduction stems from a reduced contract oversight requirement, and also gives the contracting officer greater discretion to write contracts that are not "airtight" (further reducing the costs incurred as well). A better understanding of these ideas will result in better contract and negotiation efforts in not only the construction arena but also in other aspects of contracting that federal procurement officials engage in as well. By adopting the strategy that the DoE developed and refined through its building construction efforts, the federal government can potentially save millions of dollars that can be put to use on other programs.

### **c. Risk Management**

During our research, we found that a popular opinion in the defense industry is that the only way the government can handle risk is by shifting most of it back onto the contractor; however, shifting risk to one party does not mitigate that risk. The private sector is able to effectively share the risk between all parties involved through detailed communication. The federal government's inability to effectively share risk is due to its lack of an ability to communicate openly. This problem is rooted in a segment of TCE. It appears that the government is afraid of making itself vulnerable to the contractor by communicating the fears (or risks) that it has regarding an acquisition. In order to mitigate the risk that is created by the communication problem, the public and private sector need to "create an open environment where people can exchange ideas, and that it won't be used against them" (F. Anderson, personal communication, July 11, 2011). This open environment is the first step in allowing the formation of a successful, long-term relational exchange between government and private-sector procurement professionals. Long-term relational exchanges will result in an easier transfer of best practices between the public and private sectors and drive down transaction costs



through the utilization of longer-term contracting vehicles (Dyer, 1997; Zaheer & Venkatraman, 1995).

#### **d. Procurement Knowledge Management**

Most federal agencies do not have the processes and databases in place to successfully share information within their own agencies or a comprehensive repository of complete contracts (GAO, 2006). Due to the lack of an easily accessible (and updatable) data repository, there is a significant loss and duplication of organizational learning, and consequently, federal procurement professionals are unable to share strategic sourcing lessons learned or successful acquisition strategies across the acquisition workforce. This structural hindrance to organizational learning is particularly acute (1) in an environment of high turnover of contracting personnel, (2) where the primary training means is on-the-job-training, and (3) where in-house training is less than adequate. The private sector successfully navigated this divide and established knowledge management systems that allow access to essential information, thus preserving its organizational learning and reducing redundant actions. Because federal procurement agencies lack this essential tool, they are at a significant disadvantage compared to their suppliers. The Tailored Acquisition Portal allows agency members to update information, post new regulations, and perform other actions to ensure that the content stays relevant and accurate. The federal government can reap several important benefits if it can fix the main problem that knowledge management software presents (which is maintaining it on a consistent basis) through distributed learning and crowdsourcing.

#### **e. Buyer–Seller Game Model for Bid Selection and Evaluation**

Errors in the source selection process in the public sector have cost the government significant sums due to protests, re-competitions, and termination costs. Procurement professionals in the private sector developed solutions to address the vendor/bid evaluation and selection problem. Professionals in the private sector realized that the “selection and negotiation of vendor bids is a critical decision faced





by purchasing managers” (Talluri, 2002, p. 171). Talluri’s (2002) innovative use of multi-player game theory depicts an alternative for the private sector for evaluating suppliers beyond price-only factors. While the private sector is not constrained by the trappings of the Federal Acquisition Regulation, the environment in which they operate is very similar to that which federal procurement officials face. The constraints of the Federal Acquisition Regulation may inhibit a pure adaptation of this model, but it is important that federal agencies work to apply the multi-player game theory elements behind Talluri’s model to their sourcing practices. His model would allow the federal government to utilize some of the important tenets of game theory to standardize its source selections of complex items. Through this standardization, federal procurement officials could reduce the likelihood of source selection mistakes and could reduce acquisition costs.

**f. Contingency Theory in Purchasing Organizational Design**

How a purchasing organization structures itself contributes to its success (Johnson & Leenders, 2006). Specifically, research in contingency theory has shown that in order to remain competitive (or to maximize performance), organizations must adapt their organizational structure and management practices in response to changes in the competitive environment (Galunic & Eisenhardt, 1994). In particular, the person (or persons) to whom the senior procurement official reports “plays a vital role in breaking down corporate roadblocks, setting priorities and ensuring the proper profile for supply within the organization” (Johnson & Leenders, 2006, p. 334). The lack of a strong senior procurement official for the entire federal government is where a wide gap exists between industry and federal government practices. The federal government is extremely slow to react to changes in the competitive environment, especially when it comes to purchasing-related efforts. This is due in strong part to the bureaucratic nature of federal agencies. The fact that large enterprises in the private sector undertook such radical procurement shifts to adapt and survive is important to note. The radical transformation of a large enterprise by the private sector shows that the federal government also has the



ability to adapt and utilize a contingency model to run its procurement operations so that it too can adapt and survive. By utilizing a contingency approach to adaptation, the federal government can significantly streamline its acquisition operations, significantly reduce acquisition lead-time, achieve cost savings through a reduction of labor costs, and be better able to interface with the changing face of industry.

#### D. Recommendations

In this section, we make our recommendations for improving federal procurement based on our journal article analysis of the top theories in the purchasing field, our social network analysis of the authors of the purchasing articles, and our analysis of the best practices in the purchasing field. Our research has shown that the use of purchasing theory in academic journals is continuing to grow. Practitioners in federal procurement can benefit from understanding these theories and remaining current with the latest discoveries. Therefore, to ensure the federal government has the access to the most current knowledge in the purchasing field, they should support leading-edge scholarly research by providing access to data and respondents. The federal government must also attract purchasing professionals educated at the leading institutions and entice them to join the federal procurement workforce. We recommend adoption of the following four activities in order to streamline federal sourcing efforts, reduce expenditures, and improve relations between the government and its suppliers.

##### 1. Supplier Perception Survey

Federal agencies and departments should adopt the same type of SPS that MSU fielded for the VA. This survey allows the requesting agencies to develop an in-depth understanding of how their suppliers view them and, as a result, allows them to improve their buyer–supplier relations. This improved relationship should result in reduced procurement costs, as indicated by TCE. Research on commercial practices shows us that if the supplier can be trusted, not as much time and effort needs to be spent trying to protect against supplier opportunism (Stump & Heide,



1996). Hence, it is not necessary to write an airtight contract or monitor the supplier as closely. The supplier can be trusted to do what it is supposed to do, and this lowers transaction costs (Stump & Heide, 1996). As the agencies improve their relations with their suppliers, the result will be more long-term relationships and, therefore, fewer transaction costs over the long-run. Another benefit of the SPS is that it will enhance the level of trust and commitment in the buyer–supplier relationship, which, according to relationship marketing theory, will reduce the occurrence of opportunistic behavior (Morgan & Hunt, 1994). A key aspect of the SPS used by the VA was that it was performed through a partnership with an institution ranking number one in our social network analysis, indicating that it represented the most significant contributor to the body of purchasing knowledge.

The use of an SPS would allow the federal government to understand how it is being perceived by the defense industry: as unable to handle risk except by shifting all or most of it back onto the contractor. This perception problem is a fundamental example of the principal–agent problem, as described in agency theory. The use of an SPS would open safe channels of communication between the federal government and its suppliers, eliminating many of the barriers we defined in the risk management section of Chapter IV and opening the federal government to new ways of sharing risk (i.e., long-term relational exchange, improved supplier relationship management initiatives, etc.) that would reduce the total cost of products and services.

## **2. Establish Partnerships with Top Purchasing Institutions**

In addition to partnering with the top eight purchasing institutions we identified through our social network analysis in Chapter IV to perform an SPS, individual agencies within the federal government should establish a partnership with one or more of the identified institutions to continue its purchasing professionals' education and to collaborate with on research projects. Social network theory states that when organizations cooperate and share knowledge, greater value is created for all the actors (Inkpen & Tsang, 2005). The VA and MSU were not the only organizations to



benefit from their partnership. All the other organizations in the executive education program benefited from the networking that took place, from the relationships that were created, and from the sharing of best practices among peers, which is exactly what social exchange theory predicts.

The federal government should look carefully at institutions that are located in close proximity to existing federal procurement centers (such as Wright Patterson AFB, Army Contracting Command, Navy Sea Systems Command, etc.). Selecting institutions to partner with that are near federal procurement centers would significantly increase the federal government's access to important sourcing knowledge and experience. The federal government should make it easy for these experts to transition between working for the private sector and working in federal procurement centers by giving the centers direct hiring authority. These partnerships, if enacted for the long-term, would allow the government to achieve significant cost savings on its acquisitions by leveraging the purchasing knowledge and experience found at these purchasing centers of excellence.

These types of partnerships should not be limited to academic institutions from our social network analysis but should also include partnerships with industry. We also recommend that federal agencies engage in more *education with industry* programs with institutions that have recent and relevant purchasing experience. In particular, the U.S. Air Force engages in an education with industry program, and used to insert three interns per year (Ausink, Baldwin, & Paul, 2004). Currently the number of interns has been reduced to one, and he or she does not necessarily go to a firm that is a leader in strategic sourcing (Ausink et al., 2004). However, renewing this type of partnership would allow federal procurement personnel to more quickly translate new purchasing practices from their host corporations back to the federal government.



### **3. Standardized Procurement Knowledge Management Systems**

The federal government should implement a standardized procurement knowledge management system across all agencies and departments. Organizational learning theory states that the way an organization learns and stores knowledge is important because the organization must take its information and filter and process it to be successful (Daft & Weick, 1984). The federal government needs to replace and enhance its current knowledge management systems with one that will enhance organizational learning by storing large amounts of data that is easy to access. The new system should also automate many of the processes that are currently time consuming or that are not done at all. These processes include spend analysis, market research, electronic reverse auctions, supplier performance evaluation, technical evaluations, and electronic request for proposals, quotations, or information. A quality knowledge management system would significantly reduce the amount of time purchasing professionals spend searching for the latest and greatest information.

Another major benefit of a quality knowledge management system is that the most current acquisition regulations are easy to find and are always being implemented in each contract action, reducing administrative modifications and saving time and money. Finally, a quality knowledge management system will help to correct the federal government's huge knowledge retention problems. By establishing an organizational learning system that retains the history and norms of the purchasing agency, the turnover of personnel will have a significantly reduced impact on knowledge loss and acquisition lead-time.

A standardized procurement knowledge management system would have allowed the DoE's construction contracting method to easily be spread across all federal procurement departments. This easy transfer of best practices across departments has been shown by organizational learning theory to be vital to an organization's success (Daft & Weick, 1984). An improved knowledge management system would also allow the federal government to easily adopt complicated models



for evaluating suppliers beyond price-only factors, such as those we outlined in the buyer–seller game model in Chapter IV. Contingency theory says that the ability to quickly adapt an organization’s purchasing organizational structure and management practices in response to changes in the competitive environment is vital to the organization’s success. Therefore, the federal government should implement a standardized knowledge management system so that it is able to rapidly make changes to its procurement department.

#### **4. Adopt Center-Led Procurement Model**

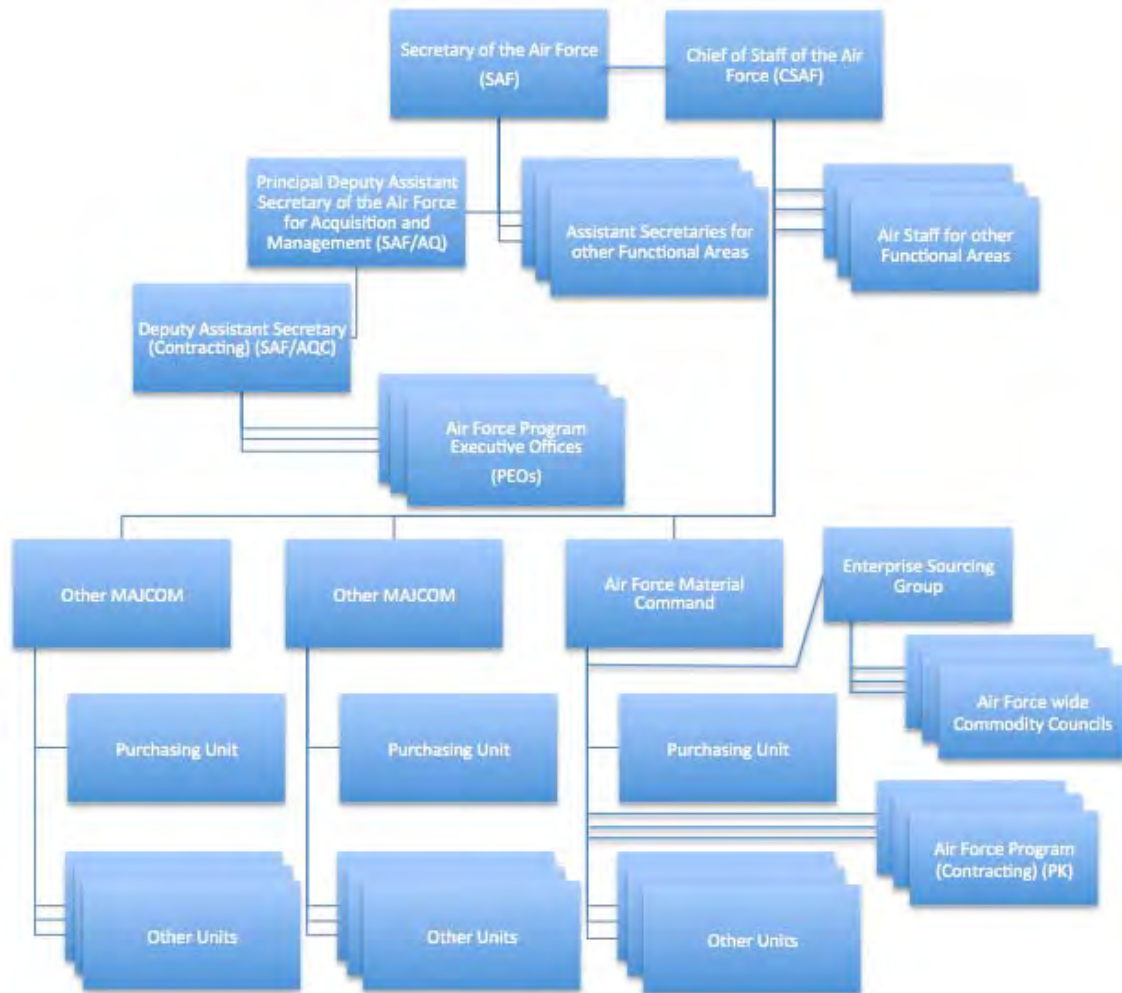
Federal agencies and departments should adopt a center-led procurement model based around procurement centers. This center-led approach has been shown to be the most successful model in the field of purchasing (Limberakis, 2011). From a federal perspective, Falcone (2010) identified the Air Force as making the best attempt out of all federal agencies to adopt a center-led purchasing organizational structure, but its progress is very slow because the purchasing center lacked the authority to engage directly with the MAJCOMs. As a result, the MAJCOMs retained operational (tactical) control. As shown in Figure 15, the Air Force purchasing center was buried under one of the MAJCOMs and therefore had no authority over most operational units. Furthermore, SAF/AQC, whose role is to organize, train, and equip and who is responsible for all contracting policy (but not to direct forces) for the Air Force, is not connected or even at the same level as the purchasing center. Fundamentally, the federal government needs the strategic objectives of individual federal agencies linked to their sourcing objectives. To ensure that this performance-objective linkage occurs, it is essential that a senior-level executive (similar to a chief procurement officer in a commercial organization) is held accountable for achieving this result. To do this, the executive must have the authority, responsibility, and accountability to design and control the work efforts of sourcing professionals within their agency. Currently, most federal agencies operate under a decentralized procurement model, which results in significantly larger amounts of tactical buying and lost opportunities for cost savings.



The current Air Force procurement organizational model is depicted in Figure 15. It should be noted that the model shown in Figure 15 is only a one-dimensional representation of the Air Force procurement structure, when in reality there are two dimensions to the organizational structure in existence today. The first dimension is the program execution relationship and authority surrounding the program executive offices and the special program offices. The second dimension is the contracting authority relationship flowing from the Secretary of Defense to the heads of contracting activities. These two dimensions are representative of two separate hierarchies residing within the same environment, with separate lines of authority and accountability. In an effort to design a simplified model, we created a hybrid organizational chart. While the hybrid depiction is helpful in crafting an understanding of the inherent structure, in some situations it may not accurately represent all of complexities surrounding the two different relationships, as well as the separation of powers and checks and balances between program execution responsibility and contracting authority.







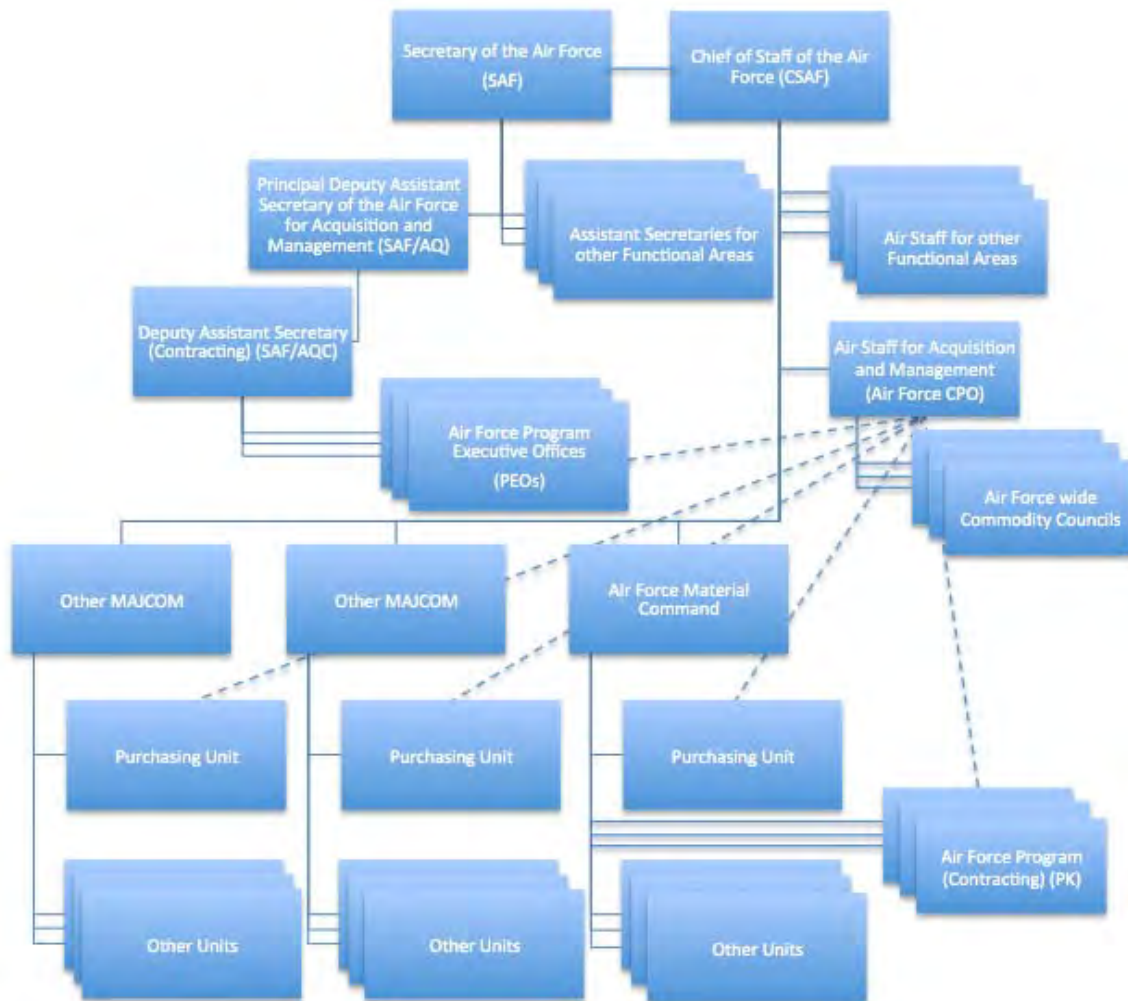
**Figure 15. Current Air Force Procurement Organizational Structure**

Currently, the Chief of Staff does not have anyone on his Air Staff responsible for the acquisition and management functional area like the Secretary of the Air Force does with the Secretary of the Air Force for Acquisition and Management (SAF/AQ). In order for the Air Force to adopt a successful center-led purchasing organizational structure as recommended by Falcone (2010), we recommend the Air Force move the purchasing center above the level of the MAJCOMs. Specifically, the purchasing center should be located directly under the Air Force Chief of Staff (CSAF), with the center serving as a de facto member of the Air Staff. As a member of the Air Staff capable of directing forces, the purchasing center will be equal to the other functionals on the Air Staff, responsible for the direction of force for acquisition and management matters and serving as the counterpart to SAF/AQ, who is



responsible for acquisition and management policy. The purchasing center would be accountable for generating the savings required by the Air Force. Our recommended organizational structure is shown in Figure 16. The purchasing units would essentially have two bosses. They would be responsible to the MAJCOMs for acquiring the required goods and services and would also be responsible to the purchasing center for meeting savings targets as depicted by the dashed line. The purchasing center would work with the functional directors as equals to ensure the broader organization's savings goals are met. The purchasing center would also have to work with SAF/AQ to make sure the policy guidance matched the organization's savings goals. Out of the relationship with SAF/AQ, the purchasing center would have a special link to the contracting program office (PK) and the program executive offices (PEOs) where they would be held accountable like the purchasing units for meeting the organizations' savings goals.

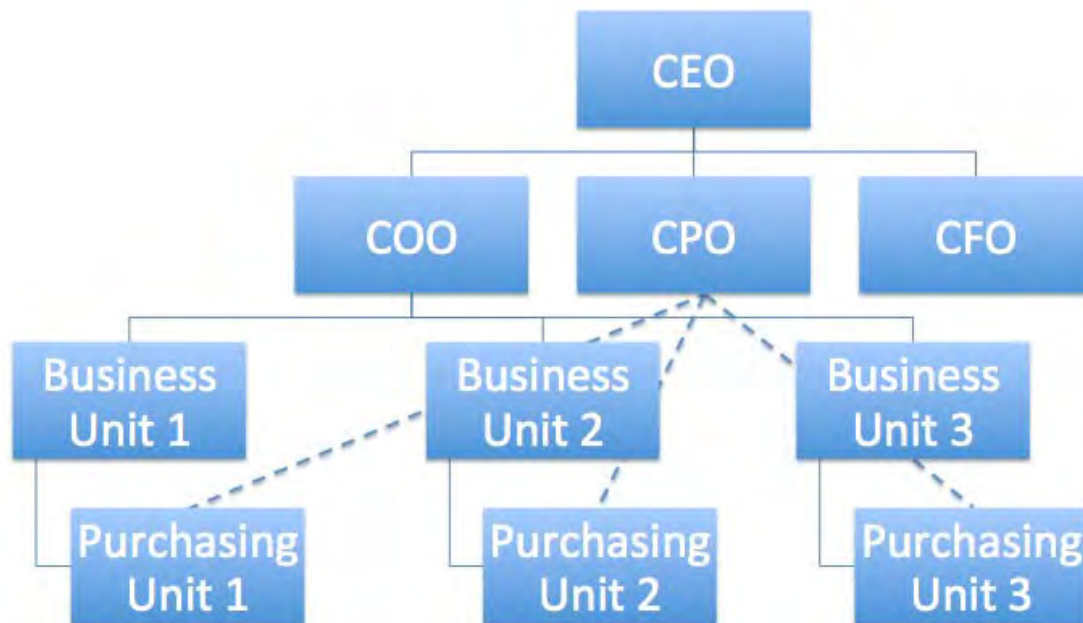




**Figure 16. Recommended Center-Led Air Force Procurement Organizational Structure**

If federal agencies continue to operate under the decentralized model, it may lead to greater numbers of procurement decisions that are “not consistent with an organizational-wide policy or the promotion of cross-functional activities particularly in larger organizations” (Limberakis, 2011, p. 15). Each separate federal agency or department should create a single procurement center to lead the agency’s procurement efforts, similar to the example best practice center-led organizational structure from industry (Axelsson, Rozemeijer, & Wynstra, 2005, p. 91) shown in Figure 17.





**Figure 17. Example Industry Best Practice Center-Led Procurement Organizational Structure**

Adopting the center-led model similar to the one shown in Figure 16 will allow for center-led execution and reconciliation of purchasing efforts, greatly reducing the amount of tactical procurement as a result. All of an organization's buying does not have to be done at a centralized procurement center, but could also be performed at regional or local centers with all the strategic decisions being made at the centralized procurement center by the CPO. Studies have shown that organizations that retain a CPO-like executive are able to achieve more significant results (larger cost savings, reduced sourcing cycle time, lower life cycle costs, etc.) when compared to those firms that lack an executive who can advocate purchasing's mission to senior leadership (Cavinato, 1987; Johnson, Leenders, & Fearon, 1998; Trent, 2004; Carter & Narasimhan, 1996).

The adoption of center-led procurement models by the federal government is supported by many different theories. The center would be able to strategically manage the relationships with the agency's critical suppliers by utilizing relationship marketing theory, agency theory, and social exchange theory. The improved



relationships would result in reduced procurement costs, as indicated by TCE. Because the organization's procurement would be led by one centralized location, it would be able to more easily transfer knowledge and would therefore reap the benefits predicted by organizational learning theory because all the procurement processes would be in one centralized location (Daft & Weick, 1984). A center-led model would allow the organization to cooperate and share knowledge, creating greater value, as predicted by social network theory (Inkpen & Tsang, 2005).

## **5. Standardize Procurement Knowledge Management Systems**

Federal agencies lack an easily accessible and updatable data repository; therefore, there is a significant loss and duplication of organizational learning within procurement organizations. If all federal agencies were to standardize procurement knowledge management systems similar to what the private sector has successfully done, the agency's organizational learning would be preserved and fewer redundant actions and repeat mistakes would occur. A center-led procurement center would be able to analyze the entire organization's procurement data, enabling procurement leadership to conduct more effective analyses on the organization's spend. One of the many different types of analysis it could perform would be Kraljic's (1983) purchasing portfolio model, in which segments spend on the premise that different types of spend should be treated differently. The purchasing center would then be able to strategically decide where to spend the most time and effort in leveraging the entire organization's spend, saving significant time and money in the process. Federal procurement professionals would be able to easily update information, post new regulations, and perform other actions to ensure that the content stays relevant and accurate. The federal government can reap several important benefits if it can fix the main problem that knowledge management software presents (which is maintaining it on a consistent basis) through distributed learning and crowdsourcing.





## E. Study Limitations

The limitations of this research, which are limitations common to most qualitative assessments, include problems encountered when coding large amounts of data. To ensure the validity of our coding process, we used a rigorous process-oriented approach modeled by Defee et al. (2010). To ensure the homogeneity of the results, we established a baseline for the different categories of theories. To maintain the legitimacy of the baseline, the two researchers met frequently to synchronize their individual understanding of the coding process.

Although the eight-year range (2002–2009) we studied in this research provided significant insights into the field, it still represents a rather narrow range given the long length of time that purchasing has been a profession. Additionally, although social network analysis provided an important measure of centrality for our study, research has shown that the measure cannot be used to compare networks of different sizes (Scott, 2000). The limited length of the study reduced the number of centrality comparisons that we could make with the sample data sets (baseline, inquiry, and full sample) because their networks were shaped differently (Scott, 1987).

While every attempt was made to conduct the literature review process in an unbiased and objective manner, research has shown (Wolf, 1986) that investigators may engage in

the selective inclusion of studies, differential subjective weighting of studies in the interpretation of findings, misleading interpretations of study findings, the failure to examine characteristics of the studies as potential explanations for disparate or consistent results across studies, and the failure to examine moderating variables. (Wolf, 1986, p. 10)

Also, during our social network analysis, it was not feasible to plot all of the 653 data points from the matrices because the resulting graphs and tables would have been illegible on a single sheet of paper. The best means to view such a large matrix would have been to utilize 3D network exploration and manipulation software



such as Gephi (Bastian, Heymann, & Jacomy, 2009). However, this software allows for impressive visualizations of complex networks, but it does not contain the important social network analysis centrality measurements that UCINET 6 and NetDraw provided us. Furthermore, UCINET 6 and Gephi utilize different data files, meaning that we would have had to construct separate matrices for each software program. Given the manpower limitations associated with our research effort, we decided to conduct our social network analysis research within UCINET (and through that, NetDraw). Without those centrality measurements, it would have been impossible to conduct the social network analysis required for this research.

#### F. Recommendations for Future Research

As more purchasing articles become available in the future, we recommend that the scope of this study be increased to include not only the new articles but also articles published prior to 2002. If the scope of this study were increased, it might be possible to ascertain potential trends that a study of only eight-years' worth of journals might have missed. Another recommendation is to examine the social network implications of the manner in which contracting knowledge is distributed and stored within different organizations within the federal government (i.e., how does operational contracting compare to systems contracting, and what can they offer each other in terms of improvements?). Finally, there were 123 different theories from the purchasing field that we identified in this study. We recommend examining the many different theories used by the purchasing field to ascertain whether it is fragmented.

Another area for future research is the opportunity to conduct citation mapping of purchasing articles to identify the foundational articles and thought leaders in the field. Researchers could also investigate to see whether previous research indicated that use of theory increases during the developmental phase and then plateau at some incidence level. They could then see how the current incidence identified compares to other incidence levels in other fields.





## G. Summary

Theory-based research is essential for the advancement and maturity of an academic discipline. Good theory is also needed to advance practice. In this study we sought to determine the extent to which theory is used in the purchasing field of research, to uncover and summarize the prevalent theories found in the purchasing field, to analyze the social network of purchasing knowledge production, and to examine how purchasing theory can inform and improve federal government purchasing practices.

We used inputs from 24 purchasing subject-matter experts and journal rankings to identify the top eight journals within the purchasing field. We examined all of the articles within these eight journals published between 2002–2009 to determine which were purchasing-related, and of those articles that were purchasing-related, the theories that were used. Through this examination, we identified the dominant theories within the purchasing field, ascertaining that the top 10 theories identified represented more than 50% of the total theoretical incidents in our research. Using the articles that we classified as purchasing-related, we conducted a social network analysis in order to better understand the underlying social network of purchasing knowledge production. Specifically, we identified the universities that represented the largest sources of education (and producers of purchasing knowledge through publication) in the purchasing field.

Applying the dominant theories identified in our research, in conjunction with the centers of purchasing knowledge identified in the social network analysis and an examination of best practices activities within the purchasing realm, we conducted a gap analysis on the federal government's sourcing efforts in order to identify potential areas for improvement to its practices. The gap analysis resulted in the identification of six purchasing best practices of interest to the advancement of federal procurement. From those six best practices, four recommendations were developed in order to streamline federal sourcing efforts, reduce expenditures, and improve relations between the government and its suppliers.



Federal procurement is in the midst of a metamorphosis in which it is trying to correct its weaknesses by matching the best practices of the private sector, while at the same time becoming as efficient as possible in light of current budget constraints. During this challenging time, federal procurement must harness the powerful ideas and theories (i.e., knowledge) coming out of the key institutions in the field of purchasing. Based on the results of our gap analysis, the federal government should implement the potential areas for improvement identified in our research.



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## Appendix A

**Table 15. Top 32 Purchasing Theories: 33 Total Theories With the Last Nine Tied for 24th Place**

<b>Rank and Theory</b>	<b>Category</b>	<b>Count</b>	<b>% of Theoretical Incidents</b>
1. Transaction Cost Economics (TCE)	Microeconomic	82	15.53%
2. Resource-Based View (RBV)	Competitive	45	8.52%
3. Social Exchange Theory	Social exchange	28	5.30%
4. Relationship Marketing	Marketing	23	4.36%
5. Contingency Theory	Competitive	21	3.98%
6. Resource Dependence Theory	Microeconomic	18	3.41%
7. Agency Theory	Microeconomic	16	3.03%
8. Game Theory	Microeconomic	15	2.84%
9*. Organizational Learning	Theories of Organizations	12	2.27%
9*. Social Network Theory	Social exchange	12	2.27%
11. Interorganizational Relationship Theory	Theories of Organizations	10	1.89%
12. Purchasing Portfolio Model	Competitive	9	1.70%
13*. Network Theory	Systems	7	1.33%
13*. Social Capital	Social exchange	7	1.33%
15*. Competitive Advantage	Competitive	6	1.14%
15*. Fuzzy Set Theory	Microeconomic	6	1.14%
15*. Theory of the Cyclical Order	Systems	6	1.14%
15*. Market Orientation	Marketing	6	1.14%
19*. Knowledge-Based View	Competitive	5	0.95%
19*. Relational Theory	Other social psychological/ sociological theories	5	0.95%
19*. Risk Management	Systems	5	0.95%
19*. Power Dependence	Psychological theories for individuals	5	0.95%
19*. Multiple Attribute Utility Theory	Systems	5	0.95%
24*. Innovation Adoption	Innovation	4	0.76%
24*. Interdependence Theory	Theories of organizations	4	0.76%
24*. Organizational Theory	Theories of organizations	4	0.76%
24*. Trust Theory	Marketing	4	0.76%

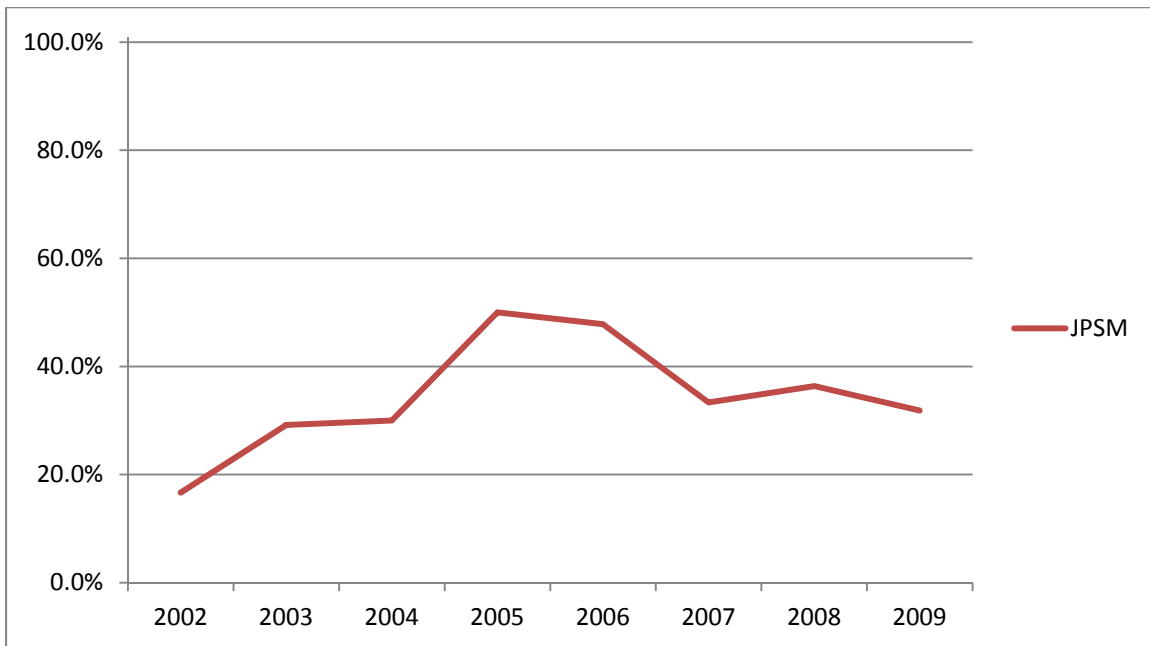


24*. Relationship Management	Marketing	4	0.76%
24*. Relational View	Competitive	4	0.76%
24*. Auction Theory	Decision	4	0.76%
24*. Total Cost	Systems	4	0.76%
24*. Communication Theory	Other social psychological/ sociological theories	4	0.76%

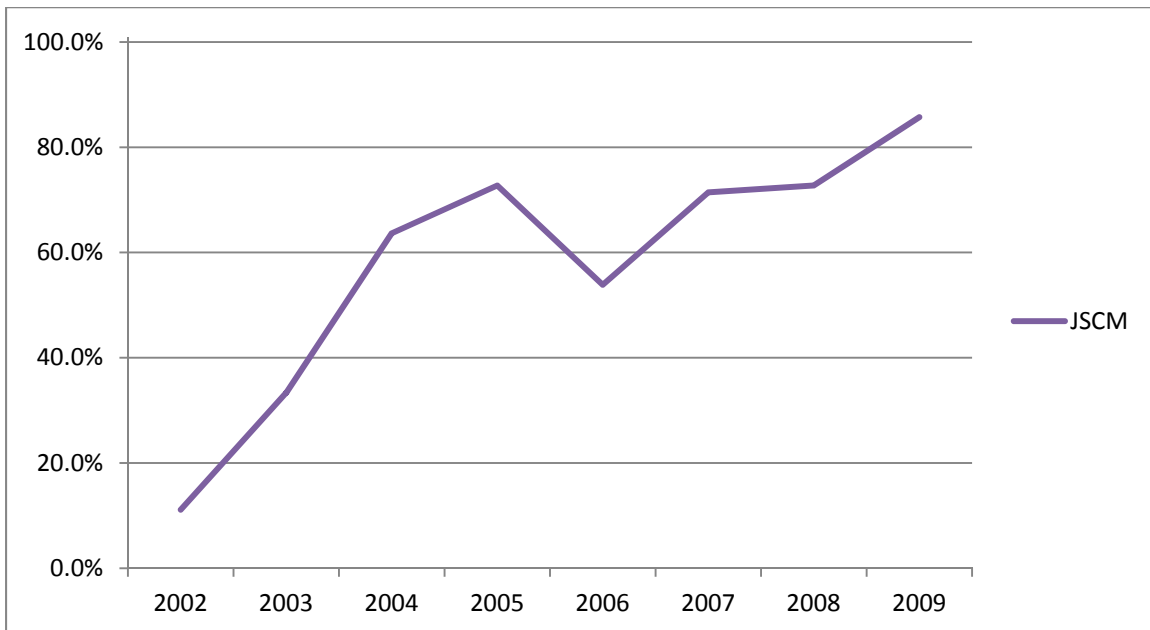
\* Indicates a tie.



## Appendix B

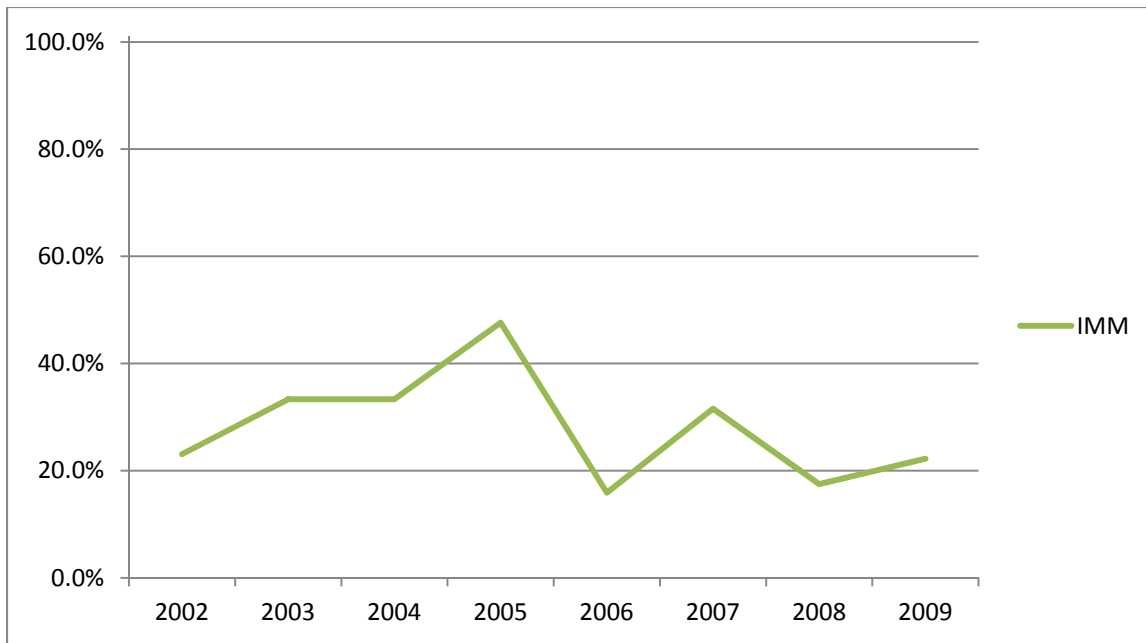


**Figure 18. Percentage of Purchasing Articles Using Theory for Journal of Purchasing & Supply Management by Year**

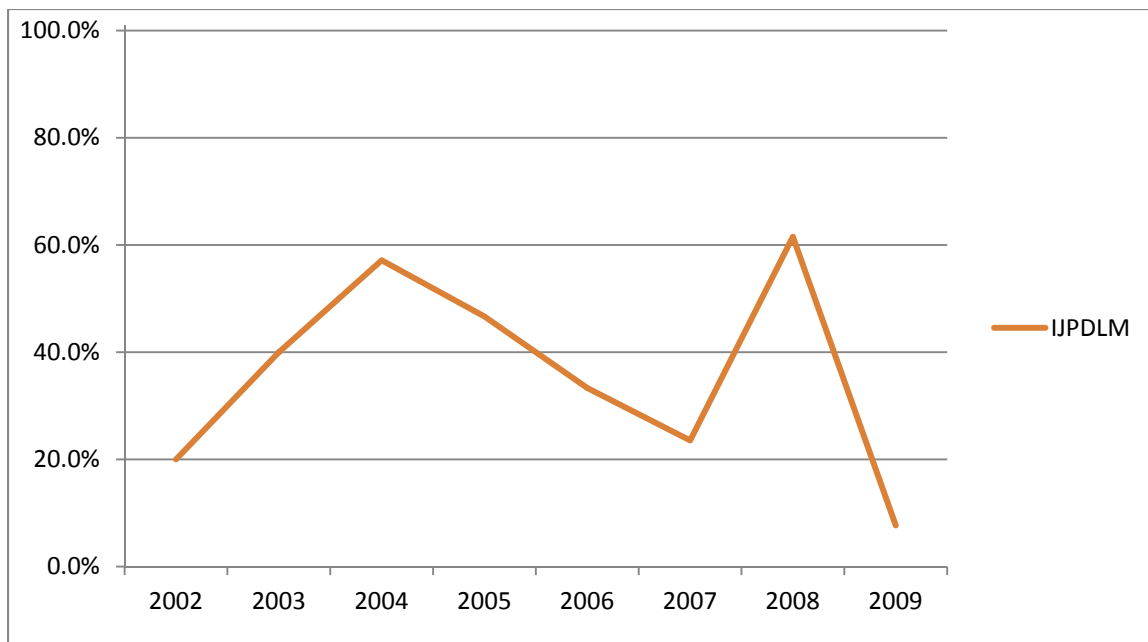


**Figure 19. Percentage of Purchasing Articles Using Theory for *Journal of Supply Chain Management* by Year**





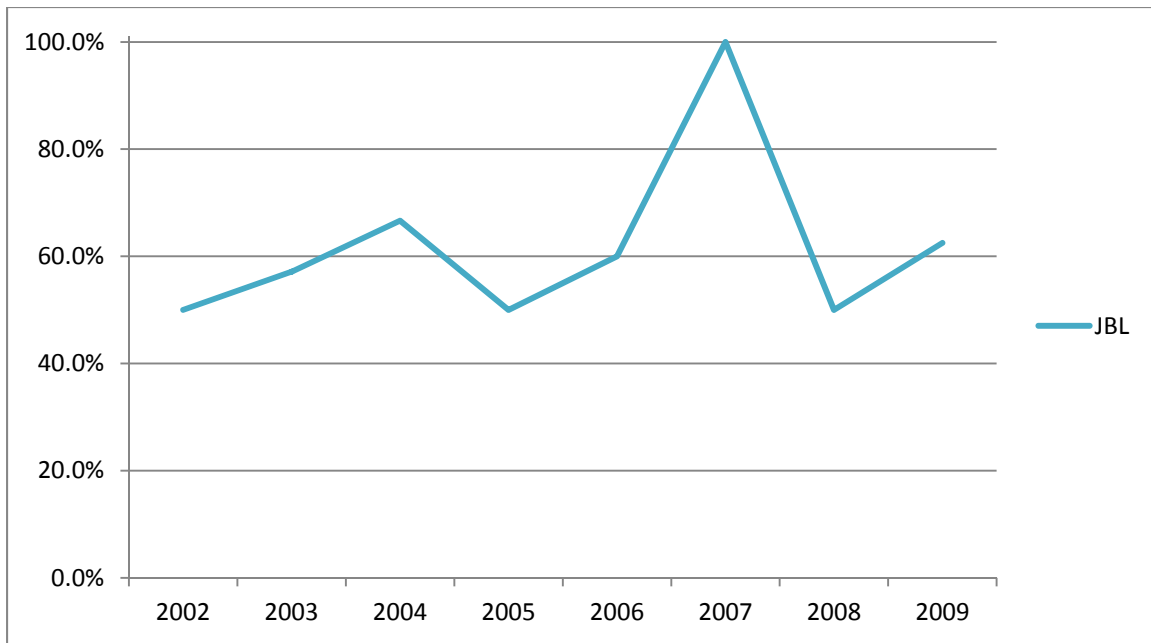
**Figure 20. Percentage of Purchasing Articles Using Theory for *Industrial Marketing Management* by Year**



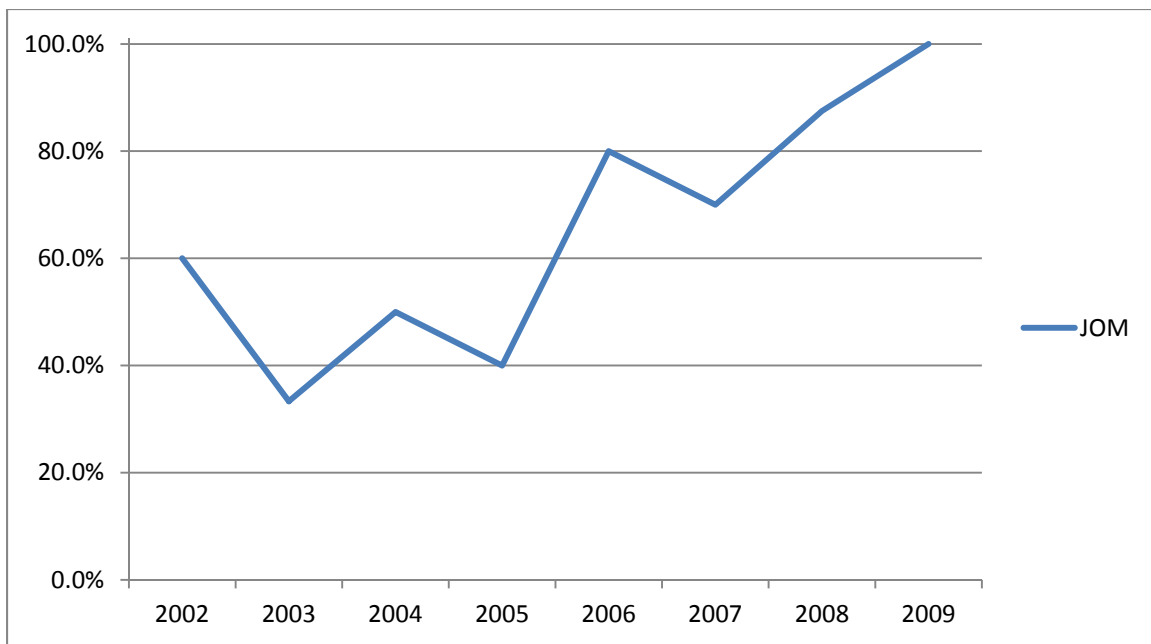
**Figure 21. Percentage of Purchasing Articles Using Theory for *International Journal of Physical Distribution and Logistics Management* by Year**





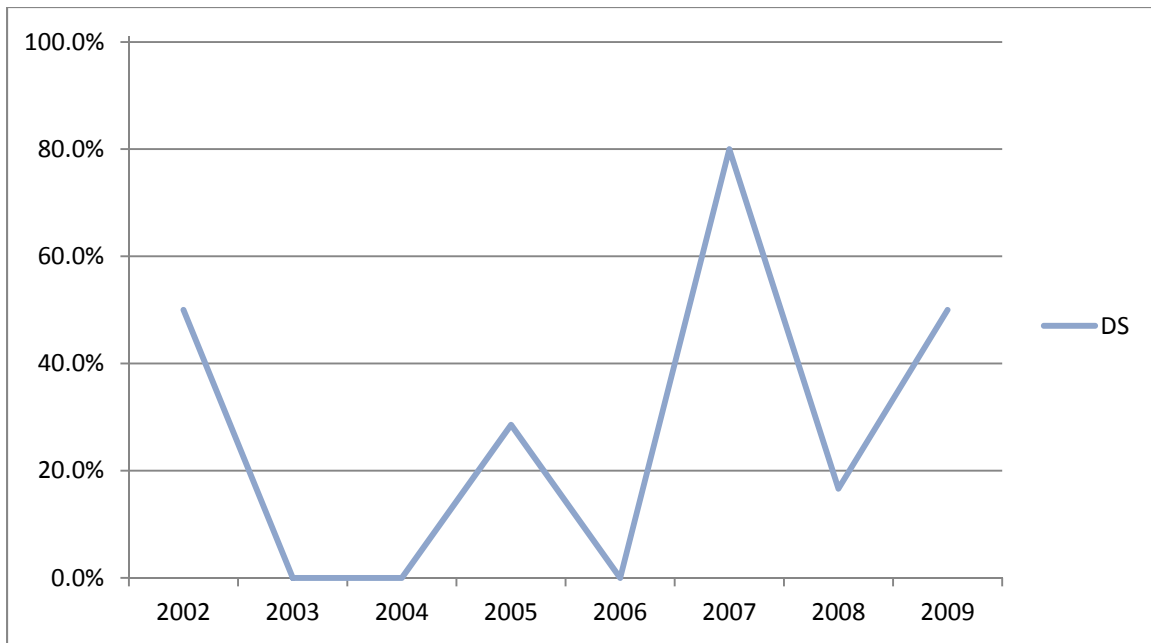


**Figure 22. Percentage of Purchasing Articles Using Theory for *Journal of Business Logistics* by Year**

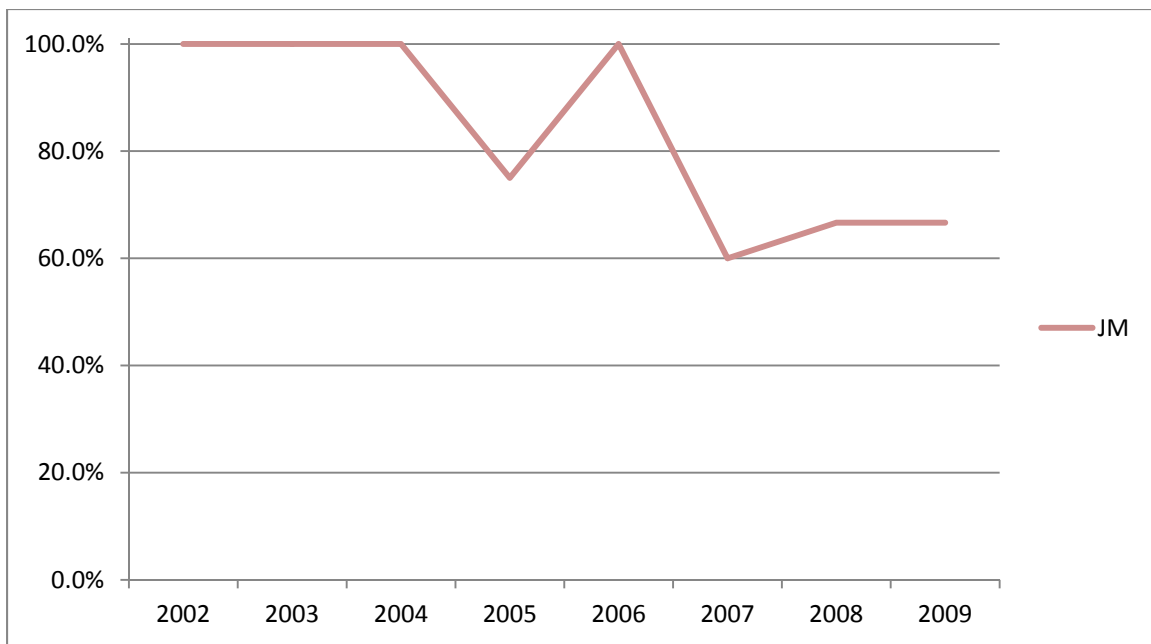


**Figure 23. Percentage of Purchasing Articles Using Theory for *Journal of Operations Management* by Year**





**Figure 24. Percentage of Purchasing Articles Using Theory for *Decision Sciences Journal* by Year**



**Figure 25. Percentage of Purchasing Articles Using Theory for *Journal of Marketing* by Year**



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- Managing the Services Supply Chain
- MOSA Contracting Implications
- Portfolio Optimization via KVA + RO
- Private Military Sector
- Software Requirements for OA
- Spiral Development
- Strategy for Defense Acquisition Research
- The Software, Hardware Asset Reuse Enterprise (SHARE) repository

## **Contract Management**

- Commodity Sourcing Strategies
- Contracting Government Procurement Functions
- Contractors in 21<sup>st</sup>-century Combat Zone
- Joint Contingency Contracting
- Model for Optimizing Contingency Contracting, Planning and Execution
- Navy Contract Writing Guide
- Past Performance in Source Selection
- Strategic Contingency Contracting
- Transforming DoD Contract Closeout
- USAF Energy Savings Performance Contracts
- USAF IT Commodity Council
- USMC Contingency Contracting



## **Financial Management**

- Acquisitions via Leasing: MPS case
- Budget Scoring
- Budgeting for Capabilities-based Planning
- Capital Budgeting for the DoD
- Energy Saving Contracts/DoD Mobile Assets
- Financing DoD Budget via PPPs
- Lessons from Private Sector Capital Budgeting for DoD Acquisition Budgeting Reform
- PPPs and Government Financing
- ROI of Information Warfare Systems
- Special Termination Liability in MDAPs
- Strategic Sourcing
- Transaction Cost Economics (TCE) to Improve Cost Estimates

## **Human Resources**

- Indefinite Reenlistment
- Individual Augmentation
- Learning Management Systems
- Moral Conduct Waivers and First-term Attrition
- Retention
- The Navy's Selective Reenlistment Bonus (SRB) Management System
- Tuition Assistance

## **Logistics Management**

- Analysis of LAV Depot Maintenance
- Army LOG MOD
- ASDS Product Support Analysis
- Cold-chain Logistics
- Contractors Supporting Military Operations
- Diffusion/Variability on Vendor Performance Evaluation
- Evolutionary Acquisition
- Lean Six Sigma to Reduce Costs and Improve Readiness



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- PBL (4)
- Privatization-NOSL/NAWCI
- RFID (6)
- Risk Analysis for Performance-based Logistics
- R-TOC AEGIS Microwave Power Tubes
- Sense-and-Respond Logistics Network
- Strategic Sourcing

## **Program Management**

- Building Collaborative Capacity
- Business Process Reengineering (BPR) for LCS Mission Module Acquisition
- Collaborative IT Tools Leveraging Competence
- Contractor vs. Organic Support
- Knowledge, Responsibilities and Decision Rights in MDAPs
- KVA Applied to AEGIS and SSDS
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